

20 SEP 1911

The Journal OF THE BOARD OF AGRICULTURE

SEPTEMBER, 1911.

PRINCIPAL CONTENTS.

(For Complete List of Contents see page vii.)

Grants from the Development Fund for the Promotion of Agricultural Research and Local Investigations -	457
The Identification and Eradication of Some Common Weeds—II. H. C. Long, B.Sc., (Edin.) -	460
The Growth of the Co-operative Movement in Denmark -	469
Changes in Agriculture and Agricultural Prices in the last Twenty Years -	481
Reports on the Proceedings of the Board under the Diseases of Animals Acts -	483
Imports of the Cereal Year -	485
The International Agricultural Congress at Madrid -	488
The Evesham Custom -	494
Promotion of Agriculture by Railway Companies in the United States -	495
School of Working Foresters, Forest of Dean -	498
Summary of Agricultural Experiments -	501
Official Circulars and Notices -	510
Miscellaneous Notes -	514
Notes on the Weather in August -	520
Crop Conditions in Great Britain on September 1st -	520
Notes on Crop Prospects Abroad -	521
Prevalence of Animal Diseases on the Continent -	524
Agricultural Labour in August -	525
The Corn Markets in August. C. Kains-Jackson -	526
The Live and Dead Meat Trade in August. A. T. Matthews -	528
The Provision Trade in August. Hedley Stevens -	530
The Fruit and Vegetable Trade in August. W. W. Glenny -	531
Statistical Tables, &c. -	533



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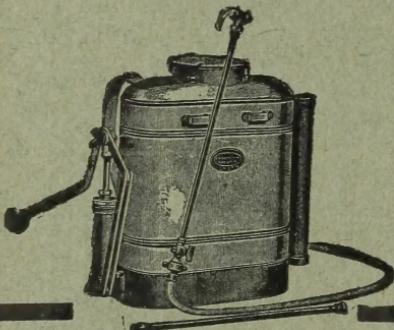


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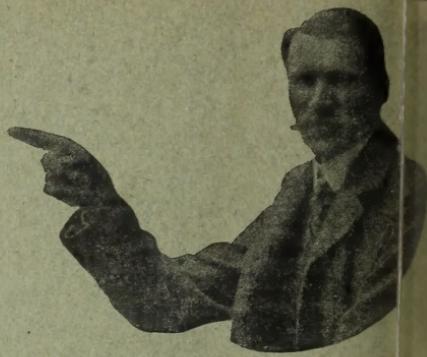


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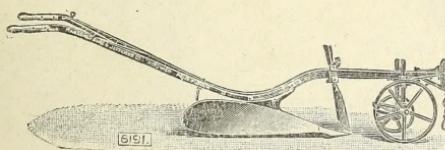
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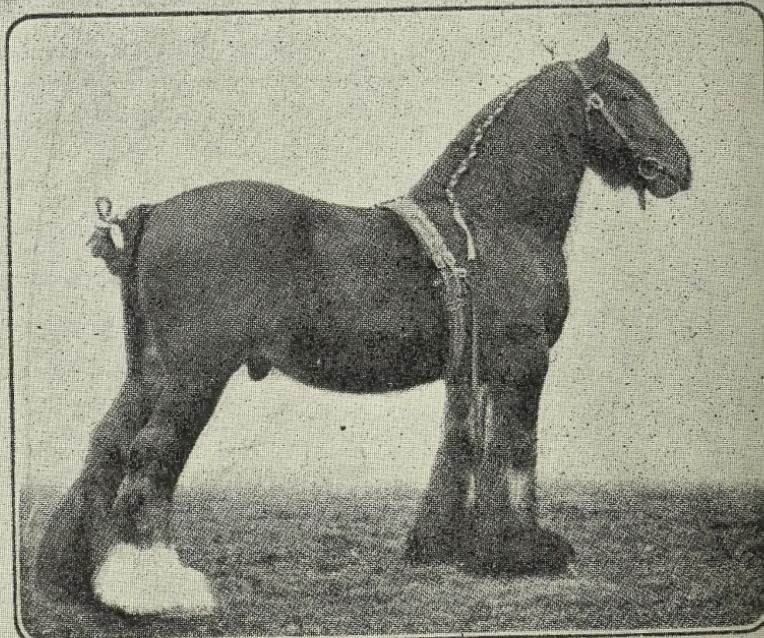


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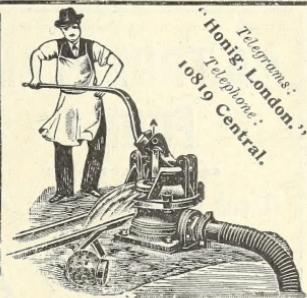
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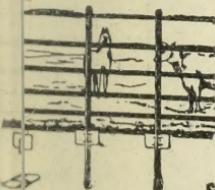
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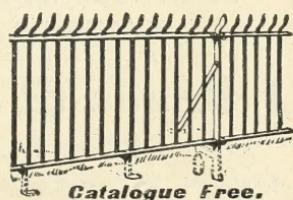
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CONTENTS.

	PAGE
GRANTS FROM THE DEVELOPMENT FUND FOR THE PROMOTION OF AGRICULTURAL RESEARCH AND LOCAL INVESTIGATIONS ...	457
THE IDENTIFICATION AND ERADICATION OF SOME COMMON WEEDS—II. <i>H. C. Long, B.Sc. (Edin.)</i> , with Drawings from Nature by <i>Bertha Reid</i> ...	460
THE GROWTH OF THE CO-OPERATIVE MOVEMENT IN DENMARK ...	469
Changes in Agriculture and Agricultural Prices in the last Twenty Years	481
Reports on the Proceedings of the Board under the Diseases of Animals <i>Acts</i> ...	483
Imports of the Cereal Year ...	485
The International Agricultural Congress at Madrid ...	488
The Evesham Custom ...	494
Promotion of Agriculture by Railway Companies in the United States	495
School of Working Foresters, Forest of Dean ...	498
Summary of Agricultural Experiments ...	501
Calcium Cyanide and Nitrate of Lime—Manuring of Meadow Hay— Manuring of Swedes and Mangolds—Manuring of Potatoes—Liming of Arable Land—Relative Economy of Ground and Slaked Lime— Varieties of Swedes—Influence of Italian Rye-Grass on other Grasses and on Clovers—Change of Seed in Oat-growing—Experi- ments with Potatoes—Soy-bean Cake as a Food for Cows—Linseed Cake for Milking Cows—Winter Fattening of Mountain Sheep— Cross-breeding for Fat Lambs—Growth of Tobacco for the Extraction of Nicotine—Potato Leaf-Blotch and Leaf-Roll—Potato Blight—Processes of Cider-Making—Blossoming and Pollination of Fruit.	
Official Circulars and Notices ...	510
Report of the Committee on Fairs Prices—Research Scholarships in Agricultural Science—Report of the Committee on Grouse Disease— Outbreaks of Foot-and-Mouth Disease—Departmental Committee on Foot-and-Mouth Disease—Recent Leaflets—County Committees for the Encouragement of the Horse Breeding Industry—Report on the Proceedings of the Board under the Tithe and other Acts.	
Miscellaneous Notes ...	514
Demand for Agricultural Machinery and Fertilisers in Russia— Live Stock and Agriculture in Egypt—Establishment of a Service for the Inspection of Plant Diseases in France—Proposed Stan- dard for Roumanian Wheat—Progress of Agriculture in Greece— Forest Reserves in Canada—Importation of English-Grown Sugar Beet into Holland—Agriculture in Argentina in 1910—Future of the Manchurian Bean Trade—Live Stock Shows at the Turin International Exhibition—Effect of Electricity on Sheep Raising.	
Notes on the Weather in August ...	520
Crop Conditions in Great Britain on September 1st ...	520
Notes on Crop Prospects Abroad ...	521
Report of the International Agricultural Institute—World's Wheat Crop—World's Hop Crop—Germany—United States.	
Prevalence of Animal Diseases on the Continent ...	524
Agricultural Labour in August ...	525
THE CORN MARKETS IN AUGUST. <i>C. Kains-Jackson</i> ...	526
THE LIVE AND DEAD MEAT TRADE IN AUGUST. <i>A. T. Matthews</i> ...	528
THE PROVISION TRADE IN AUGUST. <i>Hedley Stevens</i> ...	530
THE FRUIT AND VEGETABLE TRADE IN AUGUST. <i>W. W. Glenny</i> ...	531
Prices of Agricultural Produce ...	533
Diseases of Animals ...	538
Selected Contents of Periodicals... ...	539
Additions to the Library ...	540

NOTICE.

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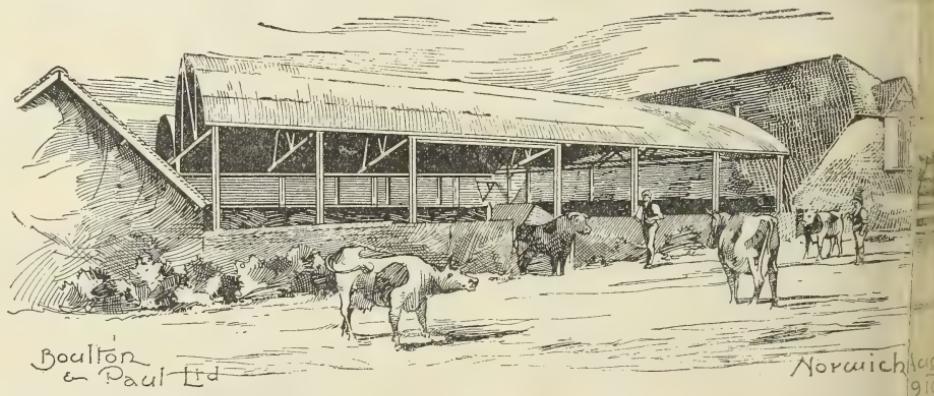
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THE JOURNAL OF THE BOARD OF AGRICULTURE

Vol. XVIII. No. 6.

SEPTEMBER, 1911.

GRANTS FROM THE DEVELOPMENT FUND FOR THE PROMOTION OF AGRICULTURAL RESEARCH AND LOCAL INVESTIGATIONS.

THE Board of Agriculture and Fisheries have been in communication with the Development Commissioners with a view to the formulation of a scheme for the promotion of agricultural research and local investigations in England and Wales, and the Treasury, on the recommendation of the Commissioners, have now sanctioned the allocation of funds to be distributed by the Board in accordance with the general principles set out below. The total maximum sum which will be expended when the scheme is in full operation will be about £50,000 per annum.

The scheme provides for—

- (1) A system of agricultural research which will secure for each group of the problems affecting rural industry a share of attention roughly proportional to its economic importance;
- (2) The concentration of the scientific work on each group at one institution or at institutions working in combination;
- (3) Grants for special investigations for which provision may not otherwise be made;
- (4) The grant of scholarships with a view to the increase of the number of men fully qualified to undertake agricultural research;
- (5) The carrying out of investigations into problems of local importance, especially those involving the application of modern research to local practice, and the provision of scientific advice for farmers on important technical questions.

SUBJECTS OF RESEARCH.

In making arrangements for the separate investigation, as far as possible, of each group of allied subjects, the Commissioners and the Board have been impressed with the importance of securing continuity in work which is necessarily of considerable duration, and at the same time of providing staffs of specialists and experts, who will be permanently engaged on work arising from the investigation of the same group of problems. By this means, concentration and economy of effort will be better secured than it would be if a number of institutions were dealing at the same time with the same group of problems.

It is neither desirable nor possible to prevent all overlapping or duplication of work, but it is obviously necessary to proceed on a plan by which research work subsidised from public funds will not be unnecessarily duplicated. It is also desirable to arrange that each problem shall be undertaken by the institution best fitted to deal with it, and usually by the institution which has specially devoted its attention to problems of an allied nature.

It is also important to avoid the giving of undue attention to one part of the field of agricultural research, to the exclusion of other parts which are of equal scientific and economic importance.

With these considerations in view, it has been arranged that grants should be made for research in the following groups of subjects :—

- (1) Plant Physiology.
- (2) Plant Pathology and Mycology.
- (3) Plant Breeding.
- (4) Fruit Growing, including the practical treatment of plant diseases.
- (5) Plant Nutrition and Soil Problems.
- (6) Animal Nutrition.
- (7) Animal Breeding.
- (8) Animal Pathology.
- (9) Dairying.
- (10) Agricultural Zoology.
- (11) Economics of Agriculture.

SPECIAL GRANTS FOR RESEARCH.

A sum not exceeding £3,000 per annum will be available for assistance in respect of special investigations for which provision is not otherwise made.

Grants from this fund will be made on the recommendation of the Board's Advisory Committee on Agricultural Science, who will consider, not only whether the proposed investigation is desirable in itself, but whether it could not be better carried out at one of the special Research Institutions referred to above. The grants will be made from year to year, and will be for one year only in each case.

SCHOLARSHIPS.*

In order to secure the services of a number of carefully trained men for work in connection with the scheme, the Board propose in each of the years 1911, 1912, and 1913, to offer twelve scholarships of the value of £150 per annum, tenable for three years.

It is proposed that candidates for scholarships should be selected by a special committee, representing the Institutions under whom the selected candidates will subsequently work. The award of twelve scholarships will be conditional on a sufficient number of thoroughly suitable candidates presenting themselves.

LOCAL ADVICE AND INVESTIGATIONS.

Grants will also be made to certain Universities, University Colleges, and Agricultural Colleges in England and Wales, for the purpose of enabling them to supply scientific advice to farmers on important technical questions, and to carry out investigations into problems of local interest, which can be more conveniently studied on the spot than at one of the Research Institutions.

By means of these grants it is hoped to provide an expert staff possessing both scientific and practical qualifications, who will devote themselves to solving difficult local problems, and in other ways endeavour to secure the application of science to practice.

* Particulars as to the conditions on which these scholarships will be awarded are given on p. 510.

THE IDENTIFICATION AND ERADICATION OF SOME COMMON WEEDS.

II.*

HAROLD C. LONG, B.Sc. (Edin.).

With Drawings from Nature by Bertha Reid.

IN the present article three weeds of the order *Cruciferae* will be dealt with; all of them are annuals, and two of them (Charlock and Runch) are among the worst weed pests of the farm.

CHARLOCK.

Charlock (*Sinapis arvensis*, L., or *Brassica Sinapis*, Visiani, or *Brassica Sinapistrum*, Boiss.) is commonly known to farmers under such names as Kedlock, Skallock, Karlock, Yellows, Yellow Weed, or Wild Mustard. Taking Great Britain as a whole, it is probably the most troublesome of all annual weeds of arable land, and in twenty-nine returns from practical agriculturists throughout England, Scotland, and Wales, as to the six worst weeds of arable land, Charlock and Runch, taken together, occupied a position which was second only to various species of couch or twitch. So serious is the damage that this weed may cause that, in 1900, the Board of Agriculture issued a leaflet dealing with its destruction.† From this leaflet the following quotation may be given:—

“In corn crops its growth is often so rank as seriously to reduce the yield of grain. In root and bean crops the weed can be more easily dealt with; but here also it often proves very injurious, and especially so when the conditions of the weather, or scarcity of labour, prevent its timely eradication. As a rule, it is not conspicuous amongst rotation grasses or clover, and it is practically absent from permanent grass land.

“The injury induced by charlock is partly direct and partly indirect. It competes with crops for light and air; that is to say, it overgrows more or less completely, and smothers, other plants with which it is associated. It also robs crops of a part of their nutriment, and prevents their deriving full benefit from the moisture of the soil. But in other ways—though more indirectly—this weed may be the cause of much loss. The turnip ‘fly,’ for instance, would be unable to exist in

* The first article appeared in the *Journal* for July, 1911, p. 288, and dealt with Corn Buttercup, Common Fumitory and Spurrey.

† Leaflet No. 63 (*Destruction of Charlock*).

early summer, when the cultivated crops on which it preys are, for the most part, absent from our fields, did it not find weeds like charlock to supply it with food; and similarly the turnip-gall weevil is often found in the roots of charlock. Then, again, the microscopic fungus that causes finger-and-toe finds a congenial habitat in the roots of this plant, which may thus do much to carry the disease over the years that separate two turnip crops."

In two cases quoted by Schultz* the presence of charlock in cereal crops caused the loss of one-third to two-thirds of the crop, the yields on charlock-infested plots and on plots from which the weed had been eradicated being as follows:—

	With Charlock.	Without Charlock.	Approximate Loss due to Charlock.
	Bushels per Acre.	Bushels per Acre.	Per Cent.
1. Oats	45	67	33
2. Oats	24·8	76·5	67·5

Charlock occurs on almost all soils, particularly, perhaps, on light calcareous loams. Brenchley found,† that between Harpenden and Bedford it was characteristic of clay soils, being "frequent" on clay and heavy soil, and also on chalk, but "occasional" on sand and light loam.

Not only is charlock a strong and rapid grower, but it produces a large quantity of seed (according to Nobbe,‡ up to 4,000 seeds on a single plant), the seeds ripening quickly, and being easily shed from the pods.

Seeds.—The seeds of charlock (Fig. 1, a) are spherical, or slightly compressed, almost smooth and finely pitted or dimpled, and $\frac{1}{25}$ to $\frac{1}{16}$ in. (1 to 1·5 mm.) in diameter. When ripe they are dark brown or black-brown to nearly black or blue-black, but when not quite ripe they are reddish to brown. When chewed, the seeds have a sharp biting taste, like mustard. Harz says that 1,000 large seeds weigh 1·478 grams. They ripen quickly, are rich in oil, and possess considerable vitality, lying dormant in the soil for many years, especially when they lie at considerable depths in the soil.

* *Arb. der Deut. Landw. Gesell.* : Ackersenf und Hederich, Gustav Schultz, 1909.

† *Jour. Bd. Agric.*, April, 1911, p. 18.

‡ Dr. Fr. Nobbe, *Handbuch der Samenkunde*, 1876.

Peter has shown * that they may thus retain their germinative capacity for forty years. On the other hand, we find it stated † that "The seeds are longer-lived than most others of the Mustard family. Recent research work showed that they do not retain their vitality beyond fifteen years." It is probable that the vitality is chiefly dependent on the natural conditions to which the seeds are subjected, the period being much longer in some instances than in others. In dealing with charlock and wild radish, Pitt wrote, over 100 years ago, that "as they are very quick of growth, and perfect their seeds expeditiously, it is not uncommon for these plants to shed their seeds at the rate of several bushels per acre, and, as it is well known that the seeds will vegetate after laying many years in the ground, it is no wonder they should produce a plentiful crop." ‡ The seeds are frequently brought to the surface by an extra deep ploughing, and while charlock disappears when land is laid down to grass, it is almost certain to spring up when old grass land is ploughed. Owing to this inherent vitality of the seed, the weed is the more difficult to deal with.

The charlock pod is 1-2 ins. long, with a straight deciduous beak; it is on a slender pedicel, is two-valved, and, when ripe, opens longitudinally, to permit the seeds to fall out [cf. *Raphanus Raphanistrum*, p. 465, in which the pod breaks into jointed pieces]. The seeds of charlock cannot, unfortunately, be easily distinguished from those of the turnip, which are of about the same size, but not quite so dark in colour, while their surface is rather rougher in texture, and they have not the same pungent taste: adulteration with dead charlock seeds was formerly common.

Seedlings.—An examination of the first seedling stage (Fig. 1, b) shows that the root is fibrous and slender, and the hypocotyl stout, white, smooth, and shiny. As in most other *Brassicac*s, the cotyledons are heart-shaped; one is larger than the other, and the notch or sinus at the top is rather deep and broadly V-shaped. The cotyledons are dark green above, sometimes with a rather reddish tinge beneath, especially in

* *Deut. Landw. Presse*, July 24th, 1909, p. 636.

† *Farm Weeds of Canada*, Canad. Dep. Agric., 2nd ed., 1909, p. 93.

‡ William Pitt: "On the Subject of Weeding; or The Improvements to be Effected in Agriculture by the Extirpation of Weeds."—*Communications to the Board of Agriculture*, Vol. v, 1806, p. 248.

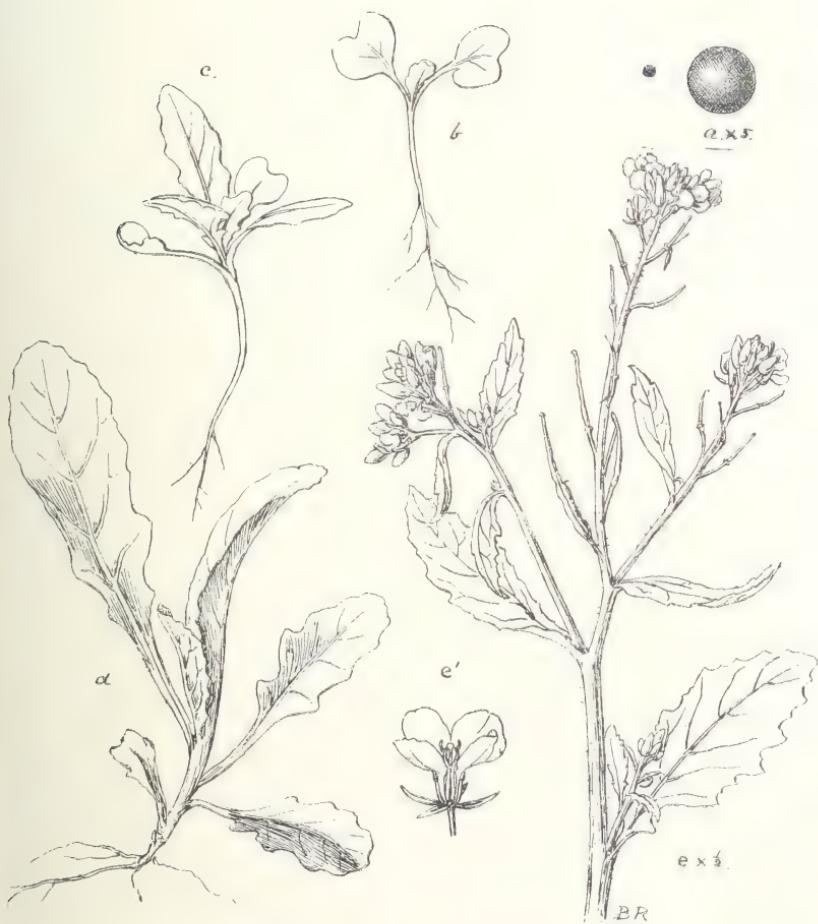


FIG. I.—CHARLOCK (*Sinapis arvensis*, L.).

a, Seed, nat. size and $\times 5$; *b*, cotyledon stage of seedling $\times 1$; *c*, second stage of seedling $\times 1$; *d*, third stage of seedling $\times 1$; *e*, flowering and fruiting portion $\times \frac{1}{2}$; *e'*, flower $\times 1$.



the early stages, while they are smooth and have long stalks which are broad, channelled above, and unequal in length.

Before the first "rough leaf" appears, the cotyledons are respectively about $\frac{1}{6}$ in. long by $\frac{1}{4}$ in. broad (4 mm. by 6 mm.), and $\frac{1}{5}$ in. long by $\frac{1}{3}$ in. broad (5 mm. by 8 mm.). With the appearance of the "rough leaf" the cotyledons enlarge considerably, attaining $\frac{2}{5}$ in. (1 cm.) in diameter, while the stalks lengthen until about $\frac{4}{5}$ in. (2 cm.) in length. The first leaves (Fig. 1, c) are dark green in colour, hairy and harsh to the touch, and somewhat spatulate or elongate-oval. [At this point it is important to distinguish the charlock seedling from that of the turnip, in which the first leaves are lighter green, nearly smooth, and about equal in length and breadth.]

The progress of the seedling is now rapid (Fig. 1, d), the cotyledons attaining $\frac{1}{2}$ in. long by $\frac{2}{3}$ in. broad (1.2 cm. by 1.6 cm.). The leaves are irregular, elongate-oval to oval or ovate, toothed, light-green, alternate, and hairy, while the stem is also hairy.

Charlock appears to vary considerably, according to its environment, and while some seedlings may be almost or quite smooth until the third stage is reached, or even until they approach flowering, they are, in general, harsh to the touch when the second stage is passed.

Mature Plant.—It may be said that in general appearance charlock (Fig. 1, e) resembles the closely related turnip. The root is stout and fibrous, the stem is branched, 1 to 3 ft. high, and rough with hairs; the leaves are rough and variable in shape, being ovate, oblong to lanceolate, or sometimes lyrate, and the lower ones are frequently segmented or lobed at the lower and broader end—the upper leaves are sessile, the lower ones stalked; the yellow cruciform flowers (Fig. 1, e') are large— $\frac{1}{2}$ in. or over in diameter—and occur in loose terminal racemes; the pods are smooth or rather rough, angular, and spreading, and 1 to 2 ins. in length, the terminal third being a stout beak, which often contains one seed. Flowering continues throughout the summer months.

Prevention and Remedy.—For the most part preventive and remedial measures in the case of charlock are intimately connected, but it may be said that there are three chief means of dealing with this weed: (1) The use of pure seeds for sowing;

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- (2) the prevention of seeding and the concurrent destruction of both seedlings and old plants by mechanical means; and
 - (3) the destruction of the weed by spraying.

(1) The first suggestion is obvious, and need not be enlarged on here.

(2) The second plan may often prove very successful, and in root and pulse crops the weed may generally be kept in check by regular hand and horse hoeing, while a crop of early potatoes, with the constant tillage it receives, is particularly useful in reducing charlock. Corn crops may also be hand hoed, and if the weed is allowed to grow tall, hand pulling will be necessary. When the plants are in flower, seeding may to some extent be prevented by chopping off the flowering heads by means of specially constructed machines, by scythes, reaping hooks, or hooks with jagged teeth; by this time, however, the damage for the current year will have been accomplished.

An excellent plan is to resort to surface cultivation in spring, by harrowing the soil to a fine tilth in order to encourage the seeds to germinate, then destroying the seedlings by harrowing or the use of the American weeder. In bad cases the process may be repeated, while the practice is often useful in a mild autumn, the young plants being killed by the first frost.

Finally, where the reaper is used, a good practice is to employ a trough attachment to the pan of the reaper, in which seeds shaken or beaten out may be caught, and subsequently destroyed. The trough should be covered with a perforated lid, through which the seeds may fall. According to Maier-Bode,* in a trial conducted at Leipzig in connection with wheat and oats, no less than 30·4 lb. of pure weed seeds were collected per acre in the case of wheat, and 35·6 lb. per acre in the case of oats, while many seeds in seed vessels were trapped in addition. Of the seeds caught in harvesting the wheat and oats, 22·15 per cent. and 21·12 per cent. respectively were charlock.

(3) As regards spraying, the principle is based upon the fact that a weak solution of copper sulphate or iron sulphate sprayed on a cereal crop has little effect on the cereal, while it quickly destroys the seedlings of charlock. This is doubtless because the leaves of cereals are narrow, smooth, and more or less erect, hence not retaining much of the solution used, and

* Fr. Maier-Bode, *Die Bekämpfung der Acker-Unkräuter*, 1908, p. 123.

so escaping permanent injury; the young leaves of charlock, on the other hand, are broad, rough, and more or less horizontal, and retain the spray fluid, to their destruction. The solution used should be a 2, 3, or 4 per cent. solution of copper sulphate* (8, 12, or 16 lb. in 40 gallons of water), or a 15 per cent. solution of iron sulphate* (60 lb. in 40 gallons of water), 40 gallons in either case being sufficient for an acre. Where a 2 per cent. solution of copper sulphate is used, it may be useful to spray a second time, after an interval of ten days or a fortnight. In wet climates the stronger solution should be employed. Soft water should be used when possible, and the spraying machine should generate a fine spray under air pressure. Spraying should take place during calm, settled weather, about the time the charlock enters the "rough leaf" stage, about May or June, when it is not more than 3 in. high, and the corn crop is still rather short.† Wooden buckets and tubs must be used to prepare the solution.

Experimental results show that spraying as recommended above does no permanent injury to the corn crop, nor to "seeds" sown in such a crop, while, in some cases at least, mangolds, beans, peas, tares, and sainfoin have been sprayed for the purpose of destroying charlock without injury to the crops concerned.

Poisonous Properties.—The whole charlock plant is irritant in character when in bloom, but the seeds are considered dangerous if eaten. It is stated by Cornevin ‡ that when used in admixture in the manufacture of a poor quality oil-cake, and fed to cattle, the cake caused intestinal inflammation, severe diarrhoea, and great thirst, probably due to oil of mustard. Percival says that the seeds "are sold by many farmers to oil-cake manufacturers, finally appearing as impurities in rape and other 'cakes.' " §

WILD RADISH.

The Wild Radish (*Raphanus Raphanistrum*, L.), known also as Runch, Jointed Charlock, or White Charlock, is a weed closely allied to *Sinapis arvensis*, which it resembles in habit,

* Ninety-eight per cent. pure.

† Charlock may also be sprayed when in flower; though spraying at this time is to be avoided when it is possible to spray the seedlings, yet it results in the destruction of many of the flowers and so largely prevents the formation of seed.

‡ Ch. Cornevin, *Des Plantes Vénéneuses*.

§ John Percival, *Agricultural Botany*, 4th ed., 1910, p. 385.

and is, perhaps, in some districts, the more common weed. When present in quantity, as is often the case, Runch is quite as harmful as common charlock, and it occurs on soils similar to those specified for that weed.

Seeds.—The seeds of wild radish are often enclosed in an egg-shaped or cylindrical portion of the pod. They are variable in size and shape, but may be described as oval or egg-shaped, somewhat compressed, reddish-brown to dark-brown, apparently smooth, but seen under a lens to be covered with a fine whitish network due to shallow depressions, and $\frac{1}{8}$ in. (3 mm.) in length (Fig. 2, *a*). Schultz says they contain 30 to 35 per cent. of oil.

Seedlings.—In the early stage seedling (Fig. 2, *b*) the root is short and fibrous, and the hypocotyl thick and fleshy, whitish, and smooth. The cotyledons are broadly heart-shaped, about equal, with equal lobes, smooth, light green above to yellowish-green or nearly yellow beneath, with alternately branched midrib, and long, rather broad petiole, which is channelled above and convex below. They are about $\frac{1}{2}$ in. long by $\frac{1}{2}$ in. broad (8 mm. by 12 mm.). The petioles are unequal in length.

In the second stage (Fig. 2, *c*) the cotyledons are larger, more clearly heart-shaped, and the alternate branches of the midrib more clearly defined. They are now about $\frac{2}{3}$ in. long by $\frac{2}{3}$ in. broad (1 cm. by 1.5 cm.). The first leaves are irregular or nearly spatulate, lobed and toothed, pointed at the apex, dark green and very hairy, with many veins which give a wrinkled appearance to the surface, and are borne on stalks about half the length of the blade.

The third stage is practically an enlarged form of the second, but the cotyledons have grown considerably, to $\frac{5}{6}$ in. long by 1 in. broad (2 cm. by 2.5 cm.), and with petioles $\frac{5}{6}$ in. and 1 in. long respectively (2 cm. and 2.5 cm.). The now elongate-oval leaves are deeply lobed towards the base, the lobes, however, being small. The whole plant is dark green and very rough with hairs, and before the flowering stem is sent up (*e.g.*, if the plant is a biennial) the leaves lie close to the ground, and are in rosette form (Fig. 2, *d*).

Mature Plant.—Runch is a stout, erect, spreading, and branched annual (or biennial), attaining 1-3 ft. in height. It is covered with rough hairs; the lower leaves are divided or



FIG. 2.—WILD RADISH (*Raphanus Raphanistrum*, L.).

a, 1, Fruit $\times 1$, 2, seed nat. size, and 3, seed $\times 4$; b, cotyledon stage of seedling $\times 1$; c, second stage of seedling $\times 1$, d, third stage of seedling $\times 1$; e, flowering portion $\times 1$.



lobed (sometimes lyrate), with a large terminal obovate segment, while the upper leaves may be entire and narrow; the flowers resemble those of charlock in size and form, but the petals vary in colour from white to pale straw yellow or pale lilac, with purplish veins; the seed-pods are 1-3 ins. long, terminate in a long pointed beak, are cylindrical to flattish or compressed, and are four- to eight- or even twelve-jointed, each joint containing a seed, and commonly breaking off when the pod is ripe (Fig. 2, e).

Prevention and Remedy.—This weed may be dealt with in identically the same manner as charlock, but it does not yield so readily to spraying in the older stages, and it is essential to spray when the seedlings are in the first rough-leaved stage.

NOTE.—In September, 1907, the Board received from Wolverhampton specimens of two cruciferous weeds allied to and resembling white charlock. These were *Raphanus microcarpus*, Willk., and *R. sativus*, L., var. *oleifer*, DC. The former is not very common in this country, while the latter is a rare casual. Some of the plants are very bulky, consisting of as many as twenty stems, while they are from 2 to 3 ft. high. As they were growing freely amongst corn, they were sprayed early with strong, pure, copper sulphate solution, which, however, was stated to have no effect on them whatever.* They should be combated by the mechanical means recommended in the case of charlock, as also should all species of wild Brassicas allied to the turnip.

SHEPHERD'S PURSE.

Shepherd's Purse (*Capsella Bursa-Pastoris*, DC.) is a well-known and widely distributed annual weed of arable land, and occurs in almost all situations and flowers at almost any season of the year from March to December. It grows well on most soils, but Brenchley found it "frequent" on chalk, clay, and heavy soils, and "occasional" on sand and light loams. Occasionally it occurs in great quantity, and as it grows rapidly and produces seeds and fresh generations throughout the summer months, it may cause much trouble, the seedlings following after one another in rapid succession as they are hoed out. A further objection to the presence of

* *Jour. Bd. Agric.*, February, 1908.

this weed is that it serves as a host for insect pests, and especially of the white rust, *Cystopus candidus*, which is so harmful to cultivated crucifers, e.g., wallflowers, cabbages, and related crops.

Seeds.—The seeds are long-oval, flattish, up to $\frac{1}{2}\frac{1}{4}$ in. (1 mm.) long, and rusty-brown in colour, with a dull, punctured surface (Fig. 3, *a*). They are found in clover and grass seed samples. “When put in water it develops a large amount of mucilage and a covering of rather long, but very fine, transparent hairs.” *

Seedlings.—Seeds of Shepherd’s Purse sown in May, 1911, gave rise to well-grown seedlings in seven days. The first stage seedling has a thread-like root, and a slender, smooth hypocotyl, which is whitish below to very light green above. The cotyledons are small, oval, smooth, green, opening until horizontal, and narrowing into a rather short, broad petiole; in the very early stage they are only about $\frac{1}{10}$ in. long (2·5 mm.), not including the petiole (Fig. 3, *b* and *b'*).

In the second stage the cotyledons are perhaps $\frac{1}{6}$ in. long (4 mm.). The first leaves are radical, simple, oval to “round-oval,” somewhat hairy above and beneath, and are stalked, the stalk being sparsely hairy (Fig. 3, *c*).

The seedling grows rapidly, and in the next stage (Fig. 3, *d*) the leaves are larger, increasingly lobed and cut (pinnatifid), sparsely hairy, and tufted, or growing in rosette form. The root is a branched and fibrous taproot.

Mature Plant.—The advanced seedling soon sends up a branched stem, which may be 18 ins. in height, and bears but few leaves, these being oblong or lanceolate, often toothed, and clasping the stem (Fig. 3, *e*). The flowers (Fig. 3, *e'*) are white, about $\frac{1}{10}$ in. in diameter, and occur on slender pedicels in long loose clusters (racemes); they give rise to somewhat triangular (almost obovate) flattened pods, resembling a shepherd’s “sporran,” whence the name of the plant. The pods easily distinguish it from other cruciferous plants. About ten or a dozen seeds are contained in each of the two cells of the pod, and a single plant may produce some 4,500 seeds (Maier-Bode).

Prevention and Remedy.—The chief means of reducing

* *Farm Weeds of Canada*, Canad. Dept. Agric., 2nd ed., 1909, p. 84.

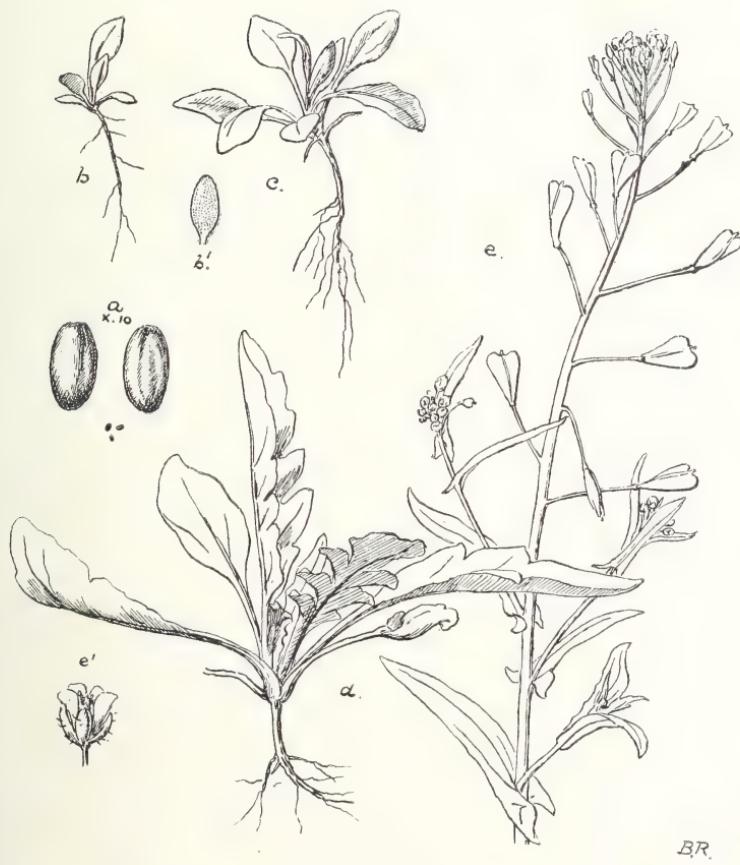


FIG. 3.—SHEPHERD'S PURSE (*Capsella Bursa-Pastoris*, DC.).

a, Seeds, nat. size and $\times 10$; *b*, early stage of seedling $\times 1$; *b'*, surface view of cotyledon $\times 2$; *c*, second stage of seedling $\times 1$; *d*, third stage of seedling $\times 1$; *e*, flowering and fruiting portion $\times 1$; *e'*, flower $\times 3$.

BR.



Shepherd's Purse are repeated surface cultivation, and the free and continued use of the hoe among root-crops. An endeavour must be made to prevent seeding of many plants, which may often be overlooked owing to their being hidden by larger crop plants. The seeds occur in samples of clover and grass seeds, and care should be taken that only pure "seeds" be sown.

THE GROWTH OF THE CO-OPERATIVE MOVEMENT IN DENMARK.

The Board have received through the Foreign Office the following report, which has been drawn up by Mr. R. Turner, late Vice-Consul and Archivist at H.M. Legation at Copenhagen, on the growth and progress of the co-operative movement in Denmark.

Growth of the Co-operative Movement.—Until the latter half of the last century Denmark was a corn-producing country, but from thirty to forty years ago various causes combined to ruin this branch of agriculture in the country, and it was then that Danish farmers began to take up dairy farming. Such success attended this departure that Denmark is now cited as being second in the list of European countries ranked according to wealth per head of the population. The new departure was from the beginning encouraged by the Government, and the judiciously applied State aid is in no small measure responsible for its success.

Apart from the geographical and other natural advantages which Denmark enjoys as regards this special branch of the agricultural industry, its success is to be very largely ascribed to the perfection to which the system of co-operation has been brought in the country. In 1890, when the co-operative movement was as yet in its infancy, the butter exported from the country (to take one instance) was calculated at 97,480,000 lb., while in 1905 Denmark exported 186,360,000 lb. of butter. At the same time the number of co-operative dairies had increased from 781 to 1,068 (exclusive of some 200 communal dairies).

Danish Co-operative System.—The system of co-operation as practised in Denmark may be said to be an adaptation of

the English Rochdale system. The first step was the foundation of a co-operative supply stores about the middle of last century, and this was followed in 1882 by the first co-operative dairy, which was started in that year by Herr Stilling Andersen at Hjedding. The movement has now developed so far that there is not a single matter of interest to the farmer that has not become the object of co-operation. The motto of co-operation in Denmark may be said to be "Each for all and all for each." This applies both to the liability incurred in raising the loan necessary to commence the undertaking, whatever it may be, and to the division of the profits of that undertaking.

Co-operation and Small Holdings.—Before dealing with the individual branches of agricultural co-operation in Denmark, it is necessary to give a brief glance at the conditions under which they have come into existence and flourished. A very well-informed Dane, in discussing the subject, stated that, in his opinion, the success of the co-operative movement in Denmark was dependent on the small holdings system, and, conversely, that without co-operation the system of small holdings would be impossible.

Land Legislation in Denmark.—The tenure of land in Denmark is, as regards the larger estates, very similar to that in England, and no special notice need be paid to it as concerning the object of this report. As regards small holdings and peasant farms, however, the position is different. All land legislation in Denmark for the past hundred years has tended to the formation of a peasant class *owning small farms*, as against the formation of large estates. Thus, an estate owner is encouraged to sell small holdings or farms to the peasants. Once a farm is in existence it must either be kept intact with all its buildings upon it, or it may be divided into two or more farms each to be worked separately, *but it may not be incorporated into another to form one large farm*. Then, too, the State has established a fund to advance money under very easy terms to suitable peasants to enable them to purchase holdings for themselves. The peasant must have saved a certain sum of money (in some cases about 10 per cent. of the purchase money of the holding—which varies between £170 and £300, including stock—is considered

sufficient), and the State advances the rest at 3 per cent. interest, and with great facilities in the matter of repayment, retaining a mortgage on the land. Thanks to beneficial legislation, a great portion of the agricultural population in Denmark own the land they work. There are about 2,117 large estates, 75,320 peasant farms of from 20 to 150 acres, and 68,000 small holdings varying from 3 to 7 acres.

Prosperity of Peasant Farmers and Small Holders.—The peasant farmers and small holders are very prosperous; the latter are paying off the mortgages on their holdings, and it is found that the previous movement of the rural population to the towns has been in a large measure arrested. In this connection it may, too, be mentioned that since the State has offered pecuniary assistance to agricultural labourers to acquire their holdings, there has been a falling off in the number of emigrants.

Advantages of Co-operation to Small Agriculturists.—The peasant farmers and small holders, being naturally men of small means, would in many instances have found it very difficult to bring their produce to an advantageous market. By means of co-operation the small man is able to reach the best market possible. The co-operative dairy of which he is a member buys his milk of him at the market rate, and sells him back at a low price the separated milk on which he feeds his pig. The pig he sells to the co-operative bacon factory at a price determined by the demand of the British market, while his eggs are disposed of to the co-operative egg export association. In this manner he receives as good a price as if he were able to bring his produce himself to Copenhagen, nor do his benefits from co-operation cease there. He obtains all he wants for himself, his family, or his farm from a co-operative supply association, while a similar association insures him.

Character of the Danish Peasant.—It must not be forgotten that the Danish peasant is a very hard-working man. His hours are generally longer than in England, and his way of life cheaper. He is also very honest. This honesty, and the mutual trust which results from it, may be taken to be the moral foundation of the co-operative movement in Denmark. Without this mutual trust, which is doubtless

strengthened very greatly by the fact that, distances being small, most members of a co-operative undertaking are personally known to each other, it is difficult to imagine how the co-operative movement could have grown so rapidly.

Education.—To this innate honesty one must add an excellent education, received in the first instance at the State school, and later at one of the high schools, agricultural colleges, or cottars' schools. These schools, by bringing young men and women of the agricultural classes together, are undoubtedly not without their value in preparing them for working along co-operative lines.

These observations may, perhaps, be considered beside the mark, but the extraordinary success which has attended the introduction of co-operation into Danish agricultural life, cannot be ascribed solely to geographical formation and favourable legislation.

Co-operative Dairies.—The first co-operative dairy in Denmark was founded in 1882 in Jutland, and the movement almost immediately became general. So quickly, indeed, did co-operative dairies spring up over the whole country that in 1903, which, unless otherwise stated, will be the year of all figures given in this report, there were some eleven hundred such dairies.

Extent of the Movement.—A better idea of the extent of the movement will be gathered from the fact that there are 174,742 farms with cows in Denmark; of these 143,863, or 82·3 per cent., are in the hands of men who are members of a co-operative dairy. (N.B.—As these figures date from 1903, it may safely be taken that there has been some increase since that year, and it may be added that when the statistics were taken, some 4,800 of the circulars sent out were returned either not filled up, or unsatisfactorily filled up, so that these figures represent a minimum, not a maximum.) Again, of the 1,066,698 cows in Denmark, 862,986, or 80·9 per cent., are owned by farmers who are members of co-operative dairies, while of the remainder about 10 per cent. deliver their milk to joint dairies, so that about nine-tenths of the milk produced in the country is dealt with in dairies working on the principle of association.

Participation of Different Classes in the Movement.—At

this point it is of interest to note the manner in which the different classes of farms participate in this movement. Of the very small farms only 3·1 per cent. are members of a co-operative dairy, but at the same time the milk of 58 per cent. of all the cows owned by this class of peasant farmer is delivered to some such dairy. In other words, most of these farmers are too small to possess a cow, while more than half of those that do are members of a co-operative dairy.

The next class most weakly interested in the co-operative dairy movement is that of the large farmers—in many cases the great land-owners—of whom only 43·5 per cent. are members of a co-operative dairy. In this case the reason is to be found in the fact that they are very often owners of dairies in which they deal with their own milk—in some few cases even adding to it by buying milk from their smaller neighbours.

Between these two extremes about 85 per cent. of all the farmers are members of a co-operative dairy, *i.e.*, about 85 per cent. of the milk produced in the country is sold to a co-operative institution.

Benefit of Co-operative Dairies to Smaller Farmers.—The immense benefit of this movement to the smaller farmers can hardly be over-estimated. It was formerly practically impossible for the smaller man to deal with the milk produced on his farm in such a manner as to secure a high and uniform standard of butter and cheese. He had to rely on the local market for the sale of his produce, and there was besides a considerable wastage of by-products. Under the co-operative system—which owes its success largely to the introduction of the centrifugal separators, which render it possible to deal with large quantities of milk expeditiously—the small farmer is assured of the best market obtainable, has more time for properly attending to his farm and stock, is able to buy back at a very low figure by-products such as separated milk, which he may need for his own purposes, and, most important of all, he has won the reliance of the market on the high and uniform standard of his produce.

Management of a Co-operative Creamery.—The society having been formed, an executive committee is elected, it in turn electing its chairman, vice-chairman, and treasurer.

The elections hold for a year. The committee appoints a manager, who is generally paid a lump sum yearly, out of which he has to pay the employees and himself. This system has many obvious disadvantages, and it is not unlikely that it will in time be changed. The manager, besides engaging the employees and supervising the working of the dairy, has to keep the books and generally control the whole business of the undertaking.

Fittings of the Creamery.—The creamery is almost invariably supplied with steam-driven centrifugal machines, and has one or more separators and pasteurisers, according to the amount of milk dealt with. The machines generally drive an electric plant and a cooling apparatus. All utensils are very carefully cleaned, as are the milk cans before their return to the farmer. Most of the machines and utensils appear to be of Danish manufacture, but English and German marks are sometimes seen. Great attention is paid to cleanliness in every department, and the farmers also are required to observe a very high standard in this respect.

Cartage of Milk.—The cartage of milk is generally done by the dairy society, who, in most cases, let it out to a contractor. The dairy charges the farmer so much per hundred pounds of milk. These charges vary from three to ten öre (rather less than $\frac{1}{2}d.$ to about $1\frac{1}{3}d.$). The farmers are bound to deliver the milk on the main road, where it is collected by the carrier. It is a common sight in Denmark to see two or three milk cans standing by the side of the road for the carrier to pick up. These cans hold a hundred pounds of milk, and are supplied by the dairy.

Treatment of the Milk.—The milk is weighed on receipt at the creamery and entered to the subscriber's account. Payment is made according to the amount of butter-fat contained in the milk. Every dairy makes regular tests of the milk supplied by its subscribers, and any falling below a certain standard is immediately notified to him, and if the fault is not remedied his milk is refused. Great care is also exercised to prevent milk from any diseased animals being sent to the creamery. Some co-operative societies even go the length of undertaking partially to indemnify a subscriber who sus-

pects one or more of his cows of being tuberculous, and, in consequence, does not send his milk to the creamery.

Formation of a Co-operative Dairy.—The capital required to start an average Danish creamery varies from £1,200 to £1,500. This sum, which would cover everything, is advanced to the co-operative society by a bank or other institution having money to invest. The farmers forming the society pledge themselves, each according to the number of cows on his farm, to be liable for this loan. The bank holds a mortgage on the factory or creamery, and has further right of recovery against each farmer in proportion to the extent of his guarantee. The farmer undertakes to sell *all* the milk produced on his farm for a certain number of years—the period varies in the different societies from seven to twenty years—to the co-operative dairy, and to observe a certain number of rules as to feeding of cows, treatment of milk, utensils, and so on. Infringements of these rules are punishable by fine, but such cases are of very rare occurrence. Each member signs an agreement drawn up in the above sense, binding himself and his farm to the observance of the rules therein contained. It thus follows that if a farm changes hands during the period for which the farmer has become a guarantor, the liability rests on the new owner.

Number of Creameries in Denmark in 1908.—The figures for the year 1908 show that there were in all 1,345 creameries in Denmark at the beginning of the year. Of this number thirty-three belonged to private persons (Heeresgaardsmejerier), 211 were communal dairies (Faellesmejerier), and the remainder, 1,101, were co-operative dairies.

Associations of Co-operative Dairies.—The greater number of these dairies are again associated in various ways. The most comprehensive of these associations is, perhaps, the Committee of the Federated Danish Dairy Associations (Desamvirkende Danske Mejeriforenings Forretningsudvalg). This Committee, which was founded in 1899, consists of the Presidents of the Associated Dairies' Unions of Jutland, of Zealand-Lolland-Falster, and of the Funen Dairies' Association, in other words, of the dairy associations of the whole of Denmark proper. Its object is to consider the proposals to be laid before the yearly meetings of the associations, and

to endeavour to concentrate and unite the efforts of the various societies in all matters connected with dairy association. The State, in the yearly budget for 1907-8, granted the Committee Kr. 4,000 (£222) towards the expenses of butter exhibitions, and Kr. 1,000 (£55) for the wages of a consultant in the control of the dairies.

Taking next the local associations of dairies, the Presidents of which form the Committee above-mentioned, we find the Associated Dairies' Union of Jutland, composed of all the thirteen minor dairy associations of the peninsula, who again have as members 504 dairies. The object of this association is to form a connecting link between the various dairy associations of Jutland, and in general to further the interests of the dairy industry by holding butter competitions, exhibitions, giving advice, and so on. Each dairy association pays a yearly contribution calculated upon the amount of milk dealt with (in the year 1907-8 this contribution was Kr. 3 (3s. 4d.) per million pounds of milk), and each association sends one representative for each seven dairies of the association. The Union has a yearly budget of Kr. 14,000 (£777). The subscriptions amount to Kr. 6,000 (£333). The State contributed Kr. 6,650 (£369), which was expended in securing the services of an expert as consultant, in arranging butter exhibitions, and generally in forwarding the production of milk and butter.

The Associated Dairies' Union of Zealand and Lolland-Falster has a membership of five dairy associations—or in all 140 dairies. The Dairy Association of Funen is composed of 145 dairies. Both these associations have generally the same object as the Jutland union above-mentioned.

Election of the Boards of Co-operative Institutions.—As a general rule all associations in Denmark coming within the scope of co-operation are controlled by a committee and chairmen elected for different lengths of time—usually for a year. It has been found that it is better to keep such committees separate, and as a consequence we find a number of such boards—in the smaller districts and villages often composed of the same men—directing different undertakings in the various branches of agricultural co-operation, and working side by side throughout the land.

The contributions to the dairy associations are generally based on the amount of milk dealt with; in the case of the dairies themselves sometimes on the number of cows belonging to the subscriber, sometimes on the amount of milk; while in the case of bacon factories the subscription is, as a rule, regulated by the number of hogs slaughtered, the subscriber in this latter case generally guaranteeing a fixed sum.

Larger Product of the Cows on Smaller Farms.—The average yield of milk from cows on farms of the two smallest classes is considerably higher than that on larger farms. This is probably largely due to the fact that on the smaller farms the number of cows kept is proportionately fewer, and the farmer is consequently able to attend to them personally and more thoroughly than is possible on a larger scale.

Control Societies.—In 1895 a new departure was made in agricultural associations, by the formation of the first Control Society (*Kontrolforening*); the number had increased to 479 in 1907, with an aggregate membership of about 12,000. These societies are aided by the State, the subvention in 1906–7 being Kr. 120,000 (£6,666).

Formation of Control Societies.—Though not actually co-operative undertakings, these societies are formed on co-operative lines by the farmers in various districts. A membership of eight is necessary before the society can receive State aid, though this aid may be refused by the Minister of Agriculture in certain circumstances.

Object of Control Societies—Improvement of Breed of Cattle.—The principal aim of these societies is to improve the milk-producing capacities of the breed of cattle in Denmark. With this object an expert is appointed as controller (it is calculated that one controller can look after about 1,000 cows). This officer travels from one farm to another in his district and gives the farmers advice as to the cows they should select for breeding purposes, and the bulls to which it would be best to put them. The farmer has to keep a record of the weight of milk yielded by each cow, and of the butter-fat contained therein, together with details as to the amount and nature of the fodder supplied to the cow. By this means the controller is able to advise as to the profitability of the animal. The practice of breeding only from such

cows as are good milkers is said to be tending towards the production of a breed possessing unusually developed capacities in this direction.

Other Functions of the Controller.—Beside the main object of improving the breed of cattle, the controller also gives advice on other branches of agricultural industry, such as the pigs, roots, &c. He also keeps duplicate account books for each farm, being both auditor and adviser to the farmer.

Co-operative Bacon-curing Factories.—Second only in importance to the dairying industry in Danish agricultural life is the bacon-curing industry. In 1887 the import of Danish pigs in a living state into Germany was prohibited, and the Danish farmer saw himself obliged to look for another market. One or two old-established firms in Copenhagen had for some years been dealing with the British market in salted bacon, and hence the first inclination was towards Great Britain. These firms were private concerns, and used the opportune excess of supply over demand to reduce the price given to the Danish farmers for their pigs, while maintaining to a very large extent the price to their customers in London. This state of things was eminently unsatisfactory to the farmer, who, having the success of the recently started co-operative dairies before his eyes, decided to experiment in co-operation in this branch of agriculture also, and the first co-operative pig-killing and bacon-curing factory in Denmark was founded at Horsens in 1888. A certain amount of difficulty was experienced at first, the established private firms naturally offering much opposition, and the experience gained in co-operative dairying being only to a slight degree applicable to this new departure.

Growth of the Movement.—Despite various obstacles, the success of the movement was assured from the beginning. Eight new co-operative factories were established in the second year of the movement, and the number has grown yearly since. The number of co-operative pig-killing and bacon-curing factories in 1908 was thirty-six, with a membership of about 95,000. (Besides these co-operative factories there were twenty-four private firms, so that the total number of enterprises in this branch of the industry was sixty.)

Constitution and Organisation of Co-operative Pig-killing and Bacon-curing Factories.—The constitution of a co-

operative pig-killing and bacon-curing factory is, *mutatis mutandis*, materially the same as that of a co-operative dairy. The area over which the members of a co-operative slaughterery are scattered is naturally larger than that covered by a dairy. The consignments to the factory are neither daily, nor in small quantities, as in the case of dairies, but at longer intervals and in larger quantities. Again, the perishable nature of milk necessarily limits the distance over which it can be transported, while with the live pig this is not the case. The risks of transport are borne by the factory once the pig has been consigned; moreover, the factory bears the cost of transport for such pigs as are sent by train, so that all pigs, whether from far or near, arrive at the factory at an equal minimum of cost to the farmer.

The money for erecting the factories was raised by loans, as in the case of the dairies, the guarantee being in this case also for a certain number of years, generally five, seven, or ten. In most cases the original loans have already been paid off, and the factories are owned by the members themselves. The members bind themselves to deliver all their pigs to the factory (generally with the exception of the sows and hogs for breeding purposes and young pigs under a certain weight). They may, however, sell to a fellow-member, upon whom the obligation towards the factory devolves. Special rules are made as to the admittance of new members subsequent to the foundation of the factory.

The members elect their committee, which in turn elects its chairman and vice-chairman, and appoints a director of the factory, and in some cases certain other officials. The director manages the factory under the control of the committee.

The Associated Danish Co-operative Pig Slaughteries.—This association (De Samvirkende Danske Andels-Svinelagterier) was founded in 1897, and thirty-three out of thirty-six co-operative slaughteries in Denmark belong to it. It consists of members of the committees of all the associated factories, who elect a committee of five of their members, who stay in office for two years, and of two factory directors, who hold office for a year. The expenses of the association are divided among the associated factories in proportion to the number of pigs they have slaughtered, and varies from one to two öre per pig—in all about Kr. 15,000 (£833).

The objects of this association are to represent the interests of the industry as regards legislation, to secure the best information as to transport of and demand for slaughterhouse products, to work for the improvement of Danish bacon by affording the assistance of scientific consultants, &c., and to promote rational pig breeding. (There are other associations for the improvement of the various breeds of pigs, some of which are assisted by the Government but which are not co-operative in their constitution.)

A very important function of this association is :* "To diffuse immediately the latest intelligence regarding the bacon industry among those concerned." The endeavour to introduce a common quotation of prices for bacon produced in Denmark has only met with partial success up to the present. The abattoirs of Jutland and Funen have established a board which, on the receipt of biweekly dispatches from England, fixes the price as far as these abattoirs themselves are concerned. The Zealand and Lolland-Falster markets are, however, somewhat influenced by the neighbourhood of Copenhagen, and it has hitherto been found impossible to establish a general quotation for the whole country. The association, however, keeps its members informed of the state of the market and of the number of pigs slaughtered in Denmark and Ireland, so that a very good idea of the prices can be formed by the factory directors.

The action of the association in having a scientific veterinary expert at the disposal of its members (the Government have made a grant of Kr. 2,000 (£111) yearly towards the expenses of this expert) has contributed largely to the success of the Danish bacon industry. The Agricultural High School has also placed its laboratory at the disposal of the association for purposes of experiment.

It is also due to the association that the veterinary control of exported meat, which was regulated by the Law of July 29th, 1903, was recently revised, and that the standard was so raised that foreign customers of Denmark can be certain that they receive nothing but absolutely sound meat.

* Vide the "Report on Co-operative Agriculture and Rural Conditions in Denmark," published by the Department of Agriculture and Technical Instruction for Ireland, 1905.

In the Reports to the Board of Agriculture and Fisheries which accompany Parts I. and II. of the Agricultural Statistics for 1910, Mr. R. H. Rew,

Changes in
Agriculture and
Agricultural Prices
in the last
Twenty Years.

the assistant secretary in charge of the work, makes an examination of the condition of British agriculture in the first decade of the twentieth century as compared with the last decade of the nineteenth, and in Part III. (Cd. 5786, price 9d.) of these statistics, which has recently been issued, this comparison is continued as regards prices and supplies.

Summarising briefly the principal points, it may be said that as regards area the figures show a reduction of the cultivated land of the country by about half-a-million acres in the course of twenty years, the loss of about $1\frac{1}{2}$ million acres of land under arable cultivation being only partially compensated for by laying down a million acres to grass. The acreage of corn crops has been substantially reduced, but the area of potatoes has been maintained, and indeed increased, while fruit cultivation has extended very markedly. The crops of the decade 1901-10 were on the average considerably better than those of 1891-1900, and consequently the effect of reduced acreage on total supplies was somewhat diminished. Cattle increased in numbers, cows and heifers more largely than other classes, though the increase was only small, and represented, in relation to the growth of population, a serious falling off. Attention is directed to the significance of the failure of the milking herd of the country to keep pace with the steadily increasing demand for milk. Notwithstanding a reduction in the total number of sheep in the country, the maintenance of the stock of ewes indicates that sheep-breeding fairly held its own, though not if considered in relation to population. The numbers of horses and pigs also did not greatly change in the two decades.

With regard to prices, a comparison of the available figures shows that the values of nearly all kinds of British farm produce have, so far as it is possible to judge, been higher in the first decade of the twentieth century than in the last decade of the nineteenth. This will be seen from the following table :—

		1891-1900.	1901-10.	Increase + or Decrease -.	
				Actual.	Per Cent.
Wheat	... ...	... per qr.	s. d.	s. d.	
			28 2	29 10	+1 8
Barley	... ...	... "	25 0	24 6	-0 6
Oats	... ...	... "	17 5	18 0	+0 7
Fat Cattle—				d.	
First	... ...	per 8 lb.	4 7	4 9	+2
Second	... ...	... "	4 0	3 11	-1
Inferior	... ...	... "	2 7	2 9	+2
Fat Sheep—					
First	... ...	... "	5 8	5 10	+2
Second	... ...	... "	5 0	5 0	-
Inferior	... ...	... "	3 6	3 9	+3
Bacon (Irish)	... ...	per cwt.	s. a.		
Cheese (English Cheddar)	... ...	"	61 6	66 10	+5 4
Butter	... ...	... "	59 5	65 5	+6 0
Eggs	... ...	per 120	99 6	102 0	+2 6
Potatoes	... ...	... per ton	8 3	8 10	+0 7
			71 7	76 3	+4 8

The prices realised by the British farmer for the produce of his land appear to bear in many cases little relation to the quantity which he produces in a particular season. A short home harvest does not necessarily mean high prices, nor does a good crop always mean low ones. Broadly speaking, the influence of the home crop upon the markets depends on the proportion which it bears to the average total supplies, or, in other words, to the imports which compete with it. This is illustrated by a comparison between the annual production of wheat in Great Britain and the average price at which the crop in each year was sold. This shows that though there is in some years an indication that increased home production was followed by a fall of price or reduced production by a rise, the movement is not very close, and very pronounced changes in the production appear to have had a very slight effect upon the price—the home production representing only about 20 per cent. of the whole supply.

A similar comparison for potatoes, the home production of which represents about 90 per cent. of the total supply, shows the relation between prices and supply to be very marked.

The oversea supplies of commodities which directly compete with British farm produce have, it may be noted, all been larger in the decade 1901-10 than in the preceding ten years.

The Annual Reports, by the Chief Veterinary Officer (Mr. S. Stockman) and by the Assistant Secretary, Animals Division (Mr. A. W. Anstruther, C.B.), of the proceedings of the Board under the Diseases of Animals Acts, 1894 to 1910, and the Markets and Fairs (Weighing of Cattle) Acts, 1887 and 1891 for the year 1910, have recently been published (Cd. 5606, price 1s.).

Reports on the Proceedings of the Board under the Diseases of Animals Acts.

The Report of the Chief Veterinary Officer consists of a general Report on the veterinary work arising from outbreaks of foot-and-mouth disease, swine fever, glanders, anthrax, and sheep-scab, and of a Report on the scientific investigations undertaken in the Laboratory. The subjects dealt with in most detail refer to a trypanosome of British cattle, bracken-poisoning, the warble-fly, and the habits of British ticks found on sheep and cattle.

The Report of the Assistant Secretary refers to the administrative measures which were taken during the year under the Diseases of Animals Acts.

During the year 1910 foot-and-mouth disease again made its appearance in Great Britain, but the outbreak was fortunately detected in its early stages, and the infection did not spread. The number of outbreaks of swine fever fell from 1,650 in 1909 to 1,598 in 1910, of sheep-scab from 685 to 556, and of glanders and farcy from 533 to 351. On the other hand, the number of outbreaks of anthrax reported to the Board by the local authorities increased from 1,317 to 1,496.

With regard to foot-and-mouth disease, the fullest inquiry failed to establish the source from which the infection in this instance came. Many clues were followed up, but there was not sufficient evidence upon which to base an authoritative conclusion.

The position as regards swine fever generally leaves much to be desired, and Mr. Anstruther observes that it is not easy to see how any substantial improvement is to be brought about in the near future.

The reduction in the outbreaks of sheep-scab, on the other hand, is a matter for satisfaction, and the Inspectors of the Board report that the Dipping Orders throughout the country were, on the whole, well enforced, and that a general feeling

is growing up that the compulsory dipping of sheep is beneficial to the industry for reasons other than those connected solely with the eradication of sheep-scab.

Anthrax was dealt with in a new Order issued in September, 1910, which came into force at the beginning of the present year. In issuing the new Order the Board laid stress upon the fact that anthrax is a disease against which it is not practicable entirely to guard on account of the multiplicity of the channels through which infection may be conveyed. Although the eradication of the disease cannot be aimed at, it is possible to bring it more under control. It is believed that the new Order will be of service in securing the collection of more trustworthy statistics to form a basis upon which to build up any other measures which further experience may indicate as likely to reduce the risk of infection, and that the co-operation of the agricultural community may be relied upon in carrying the new arrangements into effect. The experience obtained during the current year appears to show that more trustworthy statistics are being obtained.

A matter which attracted a good deal of public interest in the preceding year was the exportation of horses to the Continent, and this subject was dealt with by the Diseases of Animals Act, 1910, which enacted that it shall not be lawful, except as provided in the Act and in such cases as may be prescribed by Order of the Board, to ship or to attempt to ship any horse in any vessel from any port in Great Britain to any port outside the British Islands, unless immediately before shipment the horse has been examined by a veterinary inspector appointed by the Board for the purpose, and has been certified in writing by him to be capable of being conveyed to such port and disembarked without cruelty.

The Board's Senior Superintending Veterinary Inspector, in his Report to the Board, states that the persons interested in the trade in horses to the Continent seem now to admit that the changes which have been made have put the trade on a firmer and more satisfactory basis, and that the greater measure of uniformity in administration which has been brought about by the direct intervention of the Central Authority has, on the whole, been beneficial to their business. He is further of opinion that much of the

discomfort to which horses have in the past been subjected during the voyage is now avoided by the improvement which has been brought about in the vessels used in the trade and their fittings, and the careful attention which is given to the feeding and watering of the horses whilst on board, as well as to their comfort on the voyage.

There is still room for considerable improvement, at some of the ports at any rate, in the provision made for the shelter of horses presented for embarkation and the facilities available for resting, feeding, and watering the horses at the various places of shipment. It is, however, confidently expected that these difficulties will shortly be solved in a satisfactory manner.

IMPORTS OF GRAIN IN THE CEREAL YEAR 1910-11.

THE extent to which this country has been dependent on the Colonies and foreign countries for grain to supplement the harvest of 1910 may conveniently be considered at the end of the cereal year (September 1st to August 31st).

The imports of wheat into the United Kingdom amounted to 23,516,000 quarters, a quantity which, though it failed to reach the import of the preceding year by 580,000 quarters, has only twice been exceeded. The home harvest and the imports of flour were also less than those of 1909-10, so that, converting the flour into an equivalent quantity of wheat, the total quantity of wheat available for consumption in the United Kingdom was 33,854,000 quarters, compared with 35,500,000 quarters in 1909-10. In these amounts seed is included, but not stocks carried over. Similar figures for recent years are given in the following table:—

Harvest Year.	Wheat Crop of the United Kingdom. Qrs.	Imports of Wheat during the Cereal Year Sept. 1-Aug. 31. Qrs.	Imports of Wheat Flour in equivalent Weight of Grain. Qrs.	Total Imported Wheat and Flour in equivalent Weight of Grain. Qrs.	Total estimated Wheat Grain available for home consumption (including seed). Qrs.
1903-4	6,102,300	21,723,820	6,203,350	27,927,170	34,029,470
1904-5	4,740,000	24,529,170	3,526,620	28,055,790	32,795,790
1905-6	7,541,600	22,063,580	4,677,330	26,740,910	34,282,510
1906-7	7,557,300	22,105,180	4,284,490	26,389,670	33,966,970
1907-8	7,066,400	21,362,720	4,339,090	25,701,810	32,768,210
1908-9	6,741,200	21,727,220	3,554,650	25,281,870	32,023,070
1909-10	7,899,600	24,099,060	3,501,520	27,600,580	35,500,180
1910-11	7,074,200	23,516,140	3,263,380	26,779,520	33,853,720

With regard to the countries from which the supply of wheat was drawn, the receipts from each of the principal sources of imported wheat are given below :—

Country of Export.	Thousands of cwt.			
	1910-11.	1909-10.	1908-9.	1907-8.
India	21,460	16,077	10,904	10,480
Russia	25,728	27,911	9,470	4,455
Argentina	16,983	11,405	24,542	28,128
United States	9,479	14,911	19,299	25,273
Canada	13,826	18,539	15,118	13,578
Australia	10,417	11,915	9,587	6,264

India, Russia, Argentina, and the United States have, during the last four or five years, been substantially on an equality as regards exports to this country, any deficiency in the supplies from one being made up by the others. In 1910-11 there was a set-back to the steady increase shown by Canada in recent years, while on the other hand the decreasing tendency exhibited by the United States was well maintained. The imports of wheat from Argentina, although greater than in 1909-10, were still much below the level of some former years, the decrease compared with 1907-8, for instance, being 11,000,000 cwt. The receipts from Russia, India, Canada, and Australia were high, but in no case so high as in some former years.

With the large total quantity of wheat available in the past two cereal years, the average price has steadily declined from the high level of 1908-9. The average declared value of the imported wheat was 33s. 10d. per quarter, compared with 37s. 5d. in 1909-10, and 39s. 1d. in 1908-9. The average price of British wheat only in three weeks of November fell below 30s. per quarter, but it kept very close to the 30s. line, and the average for the harvest year was only 30s. 11d. per quarter, compared with 32s. 6d. in 1909-10, and 36s. 6d. in 1908-9. This is, however, far from being a return to the low prices generally prevailing up to 1906. English barley averaged 24s. 9d. per quarter, or 11d. above the average for the preceding year, and oats at 17s. 8d. showed no change.

The following table shows the average prices of English wheat, barley, and oats ascertained under the Corn Returns Act in each of the cereal years since 1901. The quantities

given in the table are the quantities returned as sold, from which the averages are calculated:—

Harvest years. Sept. 1-Aug. 31	Prices per quarter.						Quantities sold at certain markets.		
	Wheat.		Barley.		Oats.		Wheat.	Barley.	Oats.
1901-02 ...	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
1902-03 ...	28 4	25 11	20 4	2,451,275	3,176,599	698,840			
1903-04 ...	26 5	23 4	17 8	2,386,017	3,151,337	1,104,660			
1904-05 ...	27 2	21 10	16 4	2,129,448	2,780,473	1,132,086			
1905-06 ...	30 7	24 6	17 0	1,746,927	3,141,058	1,178,154			
1906-07 ...	28 9	24 2	18 5	2,940,263	3,202,613	940,015			
1907-08 ...	28 1	24 5	18 4	2,830,991	3,376,615	1,219,419			
1908-09 ...	32 9	25 8	18 2	2,944,256	3,564,908	1,530,848			
1909-10 ...	36 6	26 11	18 10	2,962,825	2,972,889	1,054,318			
1910-11 ...	32 6	23 10	17 8	3,144,873	2,988,483	795,824			
	30 11	24 9	17 8	2,799,763	2,992,128	831,898			

The receipts of flour have, on the whole, been declining since 1900-1, when the quantity imported was 23,000,000 cwt. The United States formerly supplied almost the whole of the flour imported into this country, but side by side with the decrease in the imports of American wheat a great drop in the supply of flour from this source has taken place. Receipts from Canada, the only other country sending any considerable quantity, have increased fairly steadily, but no country has, except temporarily, taken the place of the United States. In 1910-11 the United States sent 5,343,000 cwt., and Canada 2,970,000 cwt., while Germany and Australia each contributed nearly half a million cwts.

The imports of barley differed little from those of the previous year. Oats have fluctuated considerably in recent years, and after rising steadily to 19,600,000 cwt. in 1909-10 from a drop to only 10,900,000 cwt. in 1906-7, fell back in 1910-11 to 16,642,000 cwt. The decrease is chiefly due to smaller receipts from Russia and Germany. Of the total quantity of barley available for consumption in the United Kingdom, on the average less than a half is imported, while of oats only about one-fifth is imported, and in the case of both these cereals there has been no tendency to an increase in the imports for many years.

As regards maize, the 45,951,000 cwt. received showed a recovery from the relatively small imports of 1909-10 (34,642,000 cwt.), but the figure is still considerably below those of some former years.

The aggregate imports of the principal cereals in each of the past seven years are given below:—

Harvest year.	Millions of cwt.				
	Wheat.	Wheat Meal and Flour.	Barley.	Oats.	Maize.
1910-11	100.8	10.1	20.1	16.6	46.0
1909-10	103.3	10.8	19.9	19.6	34.6
1908-9	93.1	11.0	22.0	15.5	39.0
1907-8	91.6	13.4	17.5	13.2	39.5
1906-7	94.7	13.2	19.5	10.9	51.7
1905-6	94.6	14.4	20.3	16.0	47.1
1904-5	105.1	10.9	21.0	17.2	42.3

A preliminary statement as to the Madrid Agricultural Congress, which was held in May last, appeared in the

JOURNAL for July (p. 317). The follow-

The International Agricultural Congress at Madrid. ing detailed summary of the proceedings is based on an article by M. Henry Sagnier, the distinguished Editor of the

Journal d'Agriculture Pratique, which

he published in that periodical, and which he has most kindly permitted the Board to utilise.

The work of the Congress was distributed among eight sections, dealing with the following groups of subjects:—(1) Economics; (2) statistics; (3) surveys; (4) forestry; (5) viticulture; (6) fruit culture; (7) breeding of live stock; (8) manures. Material for the work of the sections was provided by preliminary papers, the conclusions arrived at in which were discussed, and formed a basis for the resolutions that were to be the final outcome of the Congress.

Of these resolutions some consist of recommendations, for submission to the Governments concerned, with regard to possible reforms; others are suggestions to landowners with respect to improvements that can be introduced in the cultivation of the soil. The permanent commission of the congress is charged with the duty of transmitting to the International Institute of Agriculture, at Rome, the resolutions having an international object, with the furtherance of which it is concerned.

Economics.—The first section was devoted to rural economy. This included a number of subjects of considerable

importance, and the programme was particularly full, more than twenty-five papers being submitted for consideration.

The first question dealt with was the means of keeping agriculturists on the land, including in the term landowners, farmers, and labourers. The problem has many aspects, and it arises in different forms in different countries. Among the six papers on this question that were presented, one of the most important was that of the Comte de Montornés, on a plan for the management of a large estate, which has been put into operation in the province of Valencia.* M. H. Hitier contributed an interesting paper, which was much appreciated, on the provision of suitable housing accommodation as a means of keeping agricultural labourers on the soil. Finally, the section recommended a series of legislative measures designed to facilitate the creation of small holdings, to foster co-operation and all movements directed towards the promotion of the general welfare. It insisted, also, on the advantage that would result from a reduction in the excessive subdivision of holdings. It also pointed out the advantage to municipalities, in conjunction with large landowners, of forming "back to the land" committees, for the purpose of facilitating, where desirable, the return of agricultural families to the soil.

The second subject related to agricultural education, and papers were contributed by M. H. Grosjean, on the agricultural instruction to be given to the rural classes in France; by M. Westermann, on agricultural education in Denmark; and by M. Paul de Vuyst, on associations for women agriculturists in Belgium.

Co-operation and agricultural credit formed the third subject dealt with. The conclusions arrived at were mainly of a general character. The section insisted strongly on the necessity for freedom in the creation and development of agricultural co-operative societies, especially those for the purposes of supply, production, and sale. Suggestions were made in regard to the organisation of credit societies that will be useful in countries where such societies are not numerous.

Questions relating to water supply are of the first importance in Spain, and numerous papers on the subject were contri-

* A translation of the Comte de Montornés' paper appeared in the *Journal*, August, 1911, p. 394.

buted. These dealt especially with State intervention in irrigation. In that country the demand is unanimous that the State should supply at the proper times the water that is indispensable for agricultural operations. To this end the establishment of a hydrological department is advocated, for the purpose of surveying and improving the water supply. The principle of subventions in aid of the construction of irrigation canals was approved on the ground of the eminently productive character of such undertakings, and assistance was asked, not only for new undertakings, but also for the extension of those already existing. In addition to the utilisation of surface streams, the investigation of underground sources of water was included.

The section also considered the question of weirs and the use of water power for electric power stations, undertakings that have a direct effect on the water supply for agricultural purposes. On this subject M. Léon Dabat presented a paper on the distribution of electric power, the conclusions of which were adopted by the section. They may be summarised as follows:—In granting concessions for the use of water for the purpose of electric power works, the concessionaires should only be allowed to charge a certain price for the sale of power for raising water for purposes of general utility, particularly for irrigation, sanitary purposes, drinking water, &c.

Statistics.—The second section dealt with the collection and use of statistics. The discussion resulted in a series of resolutions in the following terms:—

1. That an official statistical department should be organised in every country for the purpose of providing farmers with all the information they require to enable them to arrange their production, and that sufficient financial resources should be placed at the disposal of this department. It should be arranged that the statistics should be published as often and as rapidly as possible.

2. That legislative or administrative means should be taken in each country to verify and publish as frequently as possible, not only the prices actually current for the products of agriculture and agricultural industries, but also the quantities offered and sold at each rate quoted in the official lists.

3. That the International Institute of Agriculture at Rome should be recommended to continue the plan which it has adopted of putting at the disposal of the world the statistical material transmitted to it by the various Governments, and to develop, on as extensive a scale as possible, the series of statistical inquiries at present in course of publication.

4. That, in order to facilitate the comparative study of the statistics of different countries, relating to the trade in the products of agriculture and agricultural industries, standards of quality should be established in each country, which would serve as a basis for comparison. The Congress suggested that the International Agricultural Institute at Rome should examine this question, with the object of defining useful types.

5. That for the most important crops, cereals, for example, the reports published should begin at the earliest stage of growth, and should be published every month, up to the time immediately preceding the harvest.

Surveys.—The third section, dealing with surveys, adopted only a series of general recommendations, dealing with the methods of official surveys, their advantages and disadvantages, &c.

Forestry.—Numerous papers were presented to the forestry section, which was one of the most active sections of the Congress. The nature of the discussions is shown by the following general conclusions which were adopted :—

The progress of agriculture and stock-breeding requires, as an indispensable preliminary measure, the reafforesting, and subsequent conservation and management, of all the mountainous districts in the forest zone.

At present the mountainous districts fail to exercise their normal and natural action on the climate, the water system, and the economy of the country.

The forestry administration should divide the mountainous districts forming the forest zone into two main groups, viz., protective and productive areas. The freehold of all land included in the area of protective mountainous districts should be acquired by the State, and immediate steps taken for a soil survey, and the reafforestation and management of such land.

The State should exercise technical and administrative control over all mountainous areas that are the property of villages

or public bodies. They should be preserved, as being productive, though not protective, by the fact of being included within the forest zone. Over the remaining mountainous districts included in the forest zone and held as private property, the State should only exercise a technical inspection, sufficient to ensure their proper maintenance and improvement.

The State should proceed to the delimitation of the forest zone, and to the classification of the mountainous regions included in it into protective and productive areas, and declare them of public utility.

It was suggested that one of the most important aims of the Congress should be the conclusion of international conventions as a means of arriving at the formation of an international code on the reafforestation of mountains. A union should be established of the States bordering on the Mediterranean for the solution of the forestry problems of the region.

The various States, by example and precept, by moral and material support, and by fiscal immunities and legislative provisions designed to attract private or collective capital, should promote the maintenance and improvement of existing forests, the management, as regards forestry and grazing, of mountains, and the reafforestation of waste lands.

The State should, by various means, increase the wooded area, and maintain and improve the Alpine pastures. To this end it should strive to increase the public forest area, and to stimulate the formation of associations for the purpose, by attracting capital towards afforestation, at the same time preventing undue exploitation.

It will be necessary, in connection with rivers having an international character, that the work should be carried out on a method drawn up by agreement among the countries interested, each engaging to follow the plan as far as its financial resources and circumstances will allow.

Steps should be taken to popularise the view that agriculture will derive great benefit by the partial substitution of forestry for cultivation where the conditions are unfavourable for the latter, by increasing, in dry regions, the number of wooded pastures, and by dividing arable fields by lines of trees at right angles to the direction of the prevailing wind.

Arbour Days should be made general, and should be give-

an educational character. Societies for the promotion of tree-planting and forestry should be encouraged.

Viticulture and Fruit Growing.—The fifth section of the Congress was devoted to viticulture and wine-making, and, in view of its importance in the southern countries of Europe, the subject naturally attracted much attention. The sixth section was devoted to fruit trees, and also chiefly concerned itself with fruits grown in Southern Europe, such as the orange, lemon, and olive.

Insects and fungi attacking these trees were the subject of two reports, and, taking as a basis the results which have been attained in the U.S.A. by the introduction of certain useful insects parasitic on harmful insects, the Congress expressed the desire that entomologists in the different countries should request their respective Governments to undertake the study and classification of these useful insects, and to facilitate the exchange of colonies of these insects with countries where insects which they destroy are prevalent.

Live Stock.—In the seventh section, the feeding of cattle was the most important consideration. The Congress expressed the desire that the procedure with regard to the analysis of feeding stuffs for animals in different countries should be made uniform, and that tables of feeding values for different districts should be drawn up, showing the great differences between the nutritive value of products according to their place of origin. Such tables should be brought together in pamphlet form, for distribution to breeders, and should include typical model rations for different animals by districts.

Another resolution asked for uniformity in sanitary regulations relating to animals, and the spread among agriculturists of a practical knowledge of the hygiene of animals.

The section also dealt with methods of treatment of grass-land, and asked for the creation of organisations whose special duty it would be to act as intermediaries for the purchase of seeds, of which the quality should be guaranteed.

Manures.—The object of the eighth section was to collect information on the application of new manures produced by the absorption of nitrogen from the air.

As a result of the papers presented to the Congress, the con-

clusion was arrived at that nitrate of lime and calcium cyanamide are nitrogenous manures well deserving the attention of the whole agricultural world, though more experiments with these manures must be undertaken in order to ascertain exactly how they should be used.

The other conclusions relate to comparisons between the action of these two manures. The section concluded that nitrate of lime acts similarly to nitrate of soda, while calcium cyanamide appears to behave like sulphate of ammonia.

The occupation of land for market gardening purposes in the neighbourhood of Evesham is subject, as regards tenant

right, to what is known as the "Evesham
Custom," and just as in agricultural

districts the incoming tenant pays the outgoing tenant for the crops, so the incoming tenant in the Evesham district pays the outgoing tenant for the fruit.

The following note as to the working of the custom at the present time has been supplied to the Board by Mr. J. Henry Sabin :—

There are often apparently no clauses in the tenant's agreement with the landlord enabling the former to claim compensation for improvements, although a witness before the Committee on Fruit Culture stated that the custom had been sufficiently long in force to come under the rules of custom of the country. In fact, so strong is the custom that in many places farms and holdings are let without any lease or agreement of any sort whatever, and landlords feel perfectly secure under the custom.

"The 'Evesham' custom with regard to compensation for market gardening is based on a system of practically 'fixed' rents and 'free sale.' Under this custom notice to quit is seldom, if ever, given by a landlord, but a tenant leaving finds a purchaser for his 'improvements,' and arranges the price to be paid, including the value of items that he would not be entitled to claim under any statute, such, for instance, as buildings put up without the consent of the landlord.

"This custom has worked well. During more than twenty-five years, during which I have had the management of a

large number of allotments and small areas cultivated as market gardens, not a single tenant has made a claim against the landlords, although changes have taken place.

"The name of the proposed transferee is submitted to the landlord, who makes the necessary inquiries as to his means, &c. Occasionally the incomer seeks to make better terms as to rent, or asks that the landlords shall take the fixtures on payment of interest on their ascertained value, while in some cases recently the outgoer has represented that he could not secure a good customer on account of the rent being somewhat more than times permitted; but a very moderate reduction has usually met the case, and this has not been given until the terms of the proposed transfer have been disclosed.

"The custom is well recognised in the district, and works well. It keeps up the standard of cultivation, as good clean gardens are sought for and command a good price; but there are signs of an intention to ignore it. The Market Gardeners' Compensation Acts were strongly urged to be necessary by gardeners in the Evesham district, but I believe that they were principally newcomers who were 'making' their gardens and feared disturbance."

Information with regard to the "Evesham Custom" is given in some detail in the Minutes of Evidence of the Royal Commission on Agriculture, 1893 (C. 7400—III.), and of the Departmental Committee on Fruit Culture (Cd. 2719).

Railway companies in the United States have a vital interest in the development of agriculture in the districts through which their lines pass, since

**Promotion of
Agriculture by
Railway Companies in
the United States.*** any increase in agricultural production means an increase in the amount of produce carried to the towns, with a corresponding increase in the supplies furnished from the towns for the upkeep of the agricultural industry and a probable extension in passenger traffic owing to the growth in the rural population. An idea of the im-

* "The Transportation Companies as Factors in Agricultural Extension," U.S. Dept. of Agric. Office of Expt. Stations, Circ. 112.

portance of the traffic in agricultural produce in the United States may be obtained from the fact that in the year ended June 30th, 1909, 191,381,772 tons of such produce were carried by the railway companies, the receipts for which amounted at a very low estimate to £76,000,000, or probably well over 22 per cent. of the entire receipts of all the companies for goods traffic.

It appears from an inquiry recently made by the Office of Experiment Stations of the United States Department of Agriculture, that out of 103 railway companies, fifty-two of them were engaged to a greater or less extent in rendering assistance to the agricultural interests of their districts. It is recognised that in order that a railway company may profit to the fullest extent from the agriculture of the districts served by its lines, it must, in a new and undeveloped country, do more than construct railroads and carry goods—that is, it must itself take steps to encourage and promote the industry on which it mainly depends.

Agricultural Instruction Trains.—This method of assisting agriculturists is widely used by railway companies, and fifty-two of the leading railway companies in the United States and Canada were engaged in this form of disseminating information in 1910.

The method followed has been for each company to provide at its own expense a locomotive, luggage van, one or two coaches fitted up for lecture purposes, together with a car provided with dining-room and sleeping accommodation for the lecturers. The latter are usually furnished by the agricultural college or experiment station of the state in which the train is run, and are sometimes supplemented by specialists from the national and state departments of agriculture. Each train is equipped with material to illustrate the instruction to be given, e.g., if the instruction is to be in dairying, dairy cattle are frequently carried, together with dairy apparatus. The train is advertised in advance by means of posters and newspaper notices giving the hour at which it will arrive at each stopping-place, the length of time it will remain, the names of lecturers, and the subjects. When the train arrives at a station the farmers are invited into the lecture coaches, and are addressed by the experts for thirty

or forty minutes. Pamphlets on the subject are usually distributed free.

The fifty-two trains employed in the year 1910 covered 40,771 miles and made 1,793 stops of from forty minutes to two days each. The total cost of running the trains is estimated at £19,000, and the total number of people attending the lectures at 379,000.

Experimental Farms.—Eight railway companies have established thirteen demonstration farms to show the capabilities of the soils and climate of the districts in which they are situated. One farm is situated on marshy land, where drainage was necessary before the soil could be utilised; others have been established on sandy land generally regarded as worthless for agricultural purposes, on so-called exhausted lands, and on semi-arid lands, the object being to encourage settlement in these less desirable districts.

Organisation of Agricultural Associations.—One company has organised thirty-five associations, with an aggregate membership of 5,000 persons. This company notifies the associations promptly of changes in the demand for produce, and gives advice as to the localities where profitable markets exist. Another company in the southern United States, in addition to keeping the associations and individual growers informed daily during the season of the exact condition of the markets, undertakes to divert consignments *en route* at the direction of the consignor, *e.g.*, the consignor, after despatching his goods to a particular market, may be advised of a glut in that market, and on his telegraphing to the railway company the latter will divert the goods to another and less congested market chosen by the consignor.

Results Obtained.—All the railway companies say they are satisfied with the results of their efforts. One case is mentioned where 3,500 waggon loads of fruit and vegetables are now sent over the lines of a company, as compared with practically nothing five or six years ago. In other cases not only has there been a large increase in the production of staple crops along the railway, but also an increase in fruit and vegetable growing of fully 100 per cent. in the last five years. In one locality adapted to the growth of strawberries, a railway company agreed to furnish plants and to instruct

the farmers how to plant and grow this fruit. In the first year 86 acres were planted, with a yield of nine waggon loads. In 1904 about 1,000 acres were planted, and fifty waggon loads were despatched; and this increased two years later to between 250 and 300 loads.

The Board have been furnished with the following statement respecting the Forest of Dean School of Forestry, which

School of Working Foresters, Forest of Dean. has been prepared by Mr. C. O. Hanson, with the consent of the Commissioners of H.M. Woods and Forests :—

Previous to the year 1904 there was no school in the United Kingdom where young working men who desired to take up forestry as a business could be taught both the theory and practice of the subject. In that year the Commissioners of Woods and Forests started a small school in the Forest of Dean, which has since annually trained a small number of men to be foresters or woodmen.

The Forest of Dean is a very suitable locality for this purpose, as there is an area of some 24,000 acres of forest in the neighbourhood, including the Crown Estates of Highmeadow and Tintern, in addition to Dean Forest itself. These woods are worked in accordance with proper working plans. They are situated at all elevations up to 900 feet, and on many varieties of soil and aspect. The students can thus become familiar with the growth of trees under many conditions.

The school is essentially one for working men, and at present the number of students admitted in any year is limited to twelve, and these must ordinarily be between the ages of twenty and twenty-five years, though occasionally a student rather younger or older will be admitted for special reasons. There are no examinations for admission, but the students are chosen from amongst those who apply, the preference being given to young men who have already worked in woods or nurseries or at other work upon the land, and who are well recommended by the land agent or owner under whom they have been employed.

After admission they work in Dean Forest under the same regulations as Crown workmen and under the orders of the Crown woodman of the district to which they are sent. The school usually works in one gang under the immediate supervision of a foreman, who is an old pupil of the school. The ordinary hours of work are from 7 a.m. to 5 p.m., with half an hour for breakfast and one hour for dinner. In winter the hours are from 7.30 a.m. to 4.30 p.m., with half an hour for breakfast and again for dinner. Every alternate Saturday is a half-holiday. Usually the students spend two afternoons a week, from 1.30 to 4 p.m., with the instructor in the classroom, and occasionally go out with him for walks and excursions in the woods for the whole day.

The students are paid at the rate of 15s. a week, or 2s. 6d. a day, but do not get paid if, owing to bad weather or other cause, no work is done. The time spent in school is counted as work, and is paid for.

The education is free, and is designed to make a student thoroughly qualified to act as forester on any estate in the United Kingdom. The instruction given includes sylviculture, forest protection, forest mensuration, management and simple working plans, the felling and conversion of timber, elementary botany and surveying, arithmetic and simple accounts.

With regard to practical work in the forest, the students work in the nurseries at sowing, transplanting, trenching, weeding, and grafting; in the forest they work at planting, clearing, pruning, thinning, stripping bark, felling, and measurement of trees both felled and standing. Fencing, hedging, and draining is also done as far as is possible in connection with the ordinary routine of the forest work. In addition, each student works in the carpenter's shop for two or three months at gate-making and other rough carpentry.

The progress made is periodically tested by examinations both in the classroom and forest, the final examination being conducted by the Consulting Forester to the Commissioners of Woods. To all who satisfy the examiner a certificate, signed by the Commissioner of Woods and by the Deputy Surveyor of Dean Forest, is given.

No guarantee of employment at the end of the school

course is given by the Crown, but an endeavour is made to find suitable situations for the men. Up to date no difficulty has been found in doing this, as is shown by the following statement, which also gives some indication of the prospects for passed students :

Number of students who have received full certificates from 1904 up to June, 1911 = 40.

Present situations occupied by the above :—

Forester in Uganda	...	...	...	...	...	...	...	I
", " East Africa	...	...	...	...	...	...	...	I
Assistant Pole Inspector, Postal Department	...	...	...	...	...	...	...	I
Head Forester, War Office Estates	...	...	...	...	...	...	...	I
Private Estates	...	...	...	...	...	...	...	2
Woodmen in Crown Forests	...	...	...	...	...	...	...	5
Foresters or Woodmen on Private Estates	...	...	...	...	...	...	...	15
Workmen in Dean Forest	...	...	...	...	...	...	...	9
(Most of the above, on leaving Dean Forest, start at about 25s. per week with usually a house or lodgings in addition.)								
Other positions connected with forestry	...	...	...	...	...	...	...	2
Positions not connected with forestry...	...	...	...	...	...	...	...	3
								—
								40

The eight men who left the school last October all obtained situations within two months of leaving, and there are at present seventeen men at the school, of whom nine will leave in the present month. Of these only two have not as yet been provided for (September 1st).

The school buildings, which are situated at Parkend, consist of a classroom and large museum, where an interesting collection of exhibits connected with forestry is displayed; a dormitory for eight men, and a living room. In the same building are an institute and a miniature rifle range under separate management, which the students can use if they care to pay the subscription to become members of the two clubs. Board, lodging, and washing is given at the school for 11s. a week, the first year students being given lodgings here. After a year they move into private lodgings, which are obtainable at Parkend for about the same sum. A careful student can thus manage on his pay, but a small allowance is often given by parents or others.

The school course extends over two years, and the next class will be admitted in October, 1911. All applications for admission should be made without delay to V. F. Leese, Esq., Deputy Surveyor, Whitemead, Parkend, near Lydney, Glos., from whom full particulars can be obtained.

SUMMARY OF AGRICULTURAL EXPERIMENTS.*

SOILS AND MANURING.

Calcium Cyanamide and Nitrate of Lime (*Jour. Roy. Hort. Soc.*, Vol. 36, Pt. 3, May, 1911).—These two nitrogenous manures were tested in comparison with nitrate of soda and sulphate of ammonia by Mr. F. J. Chittenden in 1908–10. The crop grown was turnips, and the site of the trials varied each year. Nitrate of soda was used at the rate of 4 cwt. to the acre, and the other nitrogenous manures in such quantities that each plot received the same weight of nitrogen. The land was also dressed with superphosphate and kainit. The best yield was given by a different manure each year, but the total crops for the three years in each case were very similar, viz.: Nitrate of soda, 227 lb.; sulphate of ammonia, 239 lb.; calcium cyanamide, 241 lb. It thus appears that for supplying nitrogen over the whole growing period of the crop there is little to choose between these three.

Manuring of Meadow Hay (*Cumberland and Westmorland Farm School, Newton Rigg, Ann. Repts.*, 1909–10 and 1910–11).—These trial plots have been under experiment for fourteen years. They are manured every third year in order that the effect in each of the three years after manuring may be seen. The manures were last applied in 1909, and in that year plots dressed with nitrate of lime and calcium cyanamide were added. The hay crops in cwts. per acre with farmyard manure, the most successful mixture of artificials, and the two new nitrogenous manures have been as follows:—

	1909. Cwt.	1910. Cwt.	Fourteen years average. Cwt.
No manure	38	36	30
10 tons farmyard manure	41	51	42
$\frac{2}{3}$ cwt. nitrate of soda, $1\frac{1}{2}$ cwt. kainit, 3 cwt. super.	52	47	40
Two years average.			
$\frac{2}{3}$ cwt. nitrate of lime, $1\frac{1}{2}$ cwt. kainit, 3 cwt. super.	49	42	45
$\frac{2}{3}$ cwt. calcium cyanamide, $1\frac{1}{2}$ cwt. kainit, 3 cwt. super.	$48\frac{1}{2}$	48	48

Manuring of Swedes and Mangolds (*Cumberland and Westmorland Farm School, Newton Rigg, Ann. Repts.*, 1909–10 and 1910–11).—The yield of swedes has been compared on plots dressed with farmyard manure alone, farmyard manure with a small quantity of artificials, and various mixtures of artificials alone. In 1910 the crop with no manure was 5 tons per acre, and with 12 tons of farmyard manure $27\frac{1}{4}$ tons per acre. A small addition of artificials increased this to 32 tons, and very similar quantities were obtained with artificials alone.

Nitrate of lime and calcium cyanamide were also tested as top-dressings for mangolds.

Manuring of Potatoes (*Edinburgh and East of Scotland Agric. Coll., Report 24*).—The object was to demonstrate the advantage of supple-

* A summary of all reports on agricultural experiments and investigations recently received will be given each month. The Board are anxious to obtain for inclusion copies of reports on all inquiries, whether carried out by agricultural colleges, societies, or private persons.

menting the ordinary dressing of dung with a moderate application of a well-balanced mixture of artificial manure. The commonest practice in the south-eastern counties of Scotland is to grow potatoes after a corn crop, and by way of preparation to apply 15 or 20 tons of high-class farmyard manure, either on the stubble or in the drill in the spring.

Four plots were laid down at six centres, all being manured alike with farmyard manure. The effect of a dressing of $1\frac{1}{2}$ cwt. sulphate of ammonia, 4 cwt. superphosphate, and $1\frac{1}{2}$ cwt. sulphate of potash per acre was tested on one plot, and a dressing of half this quantity on another plot at each centre. The full dressing cost a little over £2 per acre, and produced an average increase of 3 tons 12 cwt. per acre; while the half-dressing increased the crop on the average by 2 tons 5 cwt. per acre, and cost £1 1s. 6d.

Another mixture was also tested with similar results, and there appears little doubt that it pays in most cases to supplement farmyard manure with a complete mixture of artificials.

Liming of Arable Land (*West of Scot. Agric. Coll., Bull. 55*).—The effect of the application of lime in large amounts at long intervals of time has been compared with the effect of small and frequent dressings. The experiment was carried out from 1902 to 1909 on a light, loamy soil poor in lime, but in excellent physical condition. Four plots of $\frac{1}{10}$ acre each in size were treated with 4 tons of lime per acre, applied in one, two, four, and eight dressings of 4 tons, 2 tons, 1 ton, and $\frac{1}{2}$ ton respectively, the first dressing being given in the winter of 1901-2, and the subsequent dressings, if any, in each succeeding winter. In addition, one plot was treated with 5 cwt. lime in each of the eight years, and the effect of the application of 4 tons gas lime in one amount was tested on another plot. The rotation during the eight years was as follows : Turnips, barley, seeds hay, oats, potatoes, wheat, seeds hay, and oats.

The conclusions drawn from this experiment may be summarised as follows :—

Large dressings of not less than 4 tons per acre applied at long intervals of time are much less effective in producing an increased yield of crops than the same quantity of lime applied more frequently in divided doses, and on such soils as that on which these experiments were conducted they are not likely to prove profitable. The largest increases were obtained in this experiment from annual applications of 10 cwt. burnt lime per acre. Applications of 5 and of 10 cwt. per acre per annum gave profitable results, but the larger dressings of 1, 2, and 4 tons per acre proved very unprofitable.

The direct application of lime to the turnip crop produced a large increase in the yield, and the larger the quantity of lime given, up to 4 tons per acre, the greater was the increase. A dressing of 10 cwt. per acre proved, however, most profitable.

On the hay crop lime applied to the previous crops was beneficial, but lime applied on the young seeds tended to diminish the yield of hay, except when given in small quantity. Liming exercised a beneficial effect on all the cereal crops, but on the potato crop the effect of liming was invariably injurious.

Gas lime applied at the rate of 4 tons per acre to the turnip crop

produced a considerably smaller increase than an equal weight of burnt lime, but in the seven succeeding years of the rotation its action was much more beneficial to the crops.

Relative Economy of Ground and Slaked Lime (*West of Scot. Agric. Coll., Bull.* 55).—An account is given of a method of slaking burnt lime in such a manner as to produce a powder as easily distributable as ground lime and at a less cost. A ton of lime shells was placed in a heap and slaked with 20 gallons of water, the heap being immediately after covered with a few inches of earth. About twelve hours later it was turned over, and water was applied to all lumps that remained unslaked; the lime was then passed through a $\frac{1}{2}$ -inch riddle to take out stones and unsalakable lumps, and the slaked lime thus riddled was found to remain in the form of a very fine dry powder, which was sown without difficulty by a manure-sowing machine. In order to get the lime into the proper condition for sowing, the heap must be turned over and riddled not less than twelve nor more than twenty-four hours after the first watering; and after the stones have been separated by riddling, the lime must be sown without delay, or it will become sticky and incapable of being sown by machine.

Slaked lime so prepared is stated to be better than ground lime, because the burnt lime in the process of slaking breaks up into a much finer powder than that produced by grinding, and it also swells into a bulk so much greater that much smaller quantities can be sown without difficulty by machine. The total cost per ton is given as 13s. 8d., compared with 18s. per ton of ground lime.

FIELD CROPS.

Varieties of Swedes (*N. of Scotland Agric. Coll., Trans. of Students' Assoc.*, 1910).—In 1910 eight varieties of green-top swedes and the variety (Buffalo) that did best in 1909 were tried by eight members of the Association. The heaviest crops per acre on the average were given by the following varieties: Buffalo Purple, 25 tons 5 cwt.; Kent and Brydon's Darlington, 25 tons 5 cwt.; Drummond's, 24 tons 6 cwt.; Sutton's, 23 tons 14 cwt. Darlington was the most consistently good, not varying so much at the different centres as the others.

Eight disease-resisting varieties were tried—four of yellow turnips and four of swedes. The season was, however, specially suited for the healthy growth of turnips, and therefore unfavourable for the trial.

Influence of Italian Rye-grass on Other Grasses and on Clovers (*N. of Scotland Agric. Coll., Trans. of Students' Assoc.*, 1910).—One of the members of the Association experienced great difficulty in getting clover to grow, and as the seed mixture used included a considerable quantity of Italian rye-grass, an experiment was arranged to test the effect on clover of substituting perennial for Italian rye-grass, and also to test the effect of manure. Five different mixtures were sown in the spring of 1909, along with an oat crop on a clay soil. Each mixture contained 6 lb. cocksfoot, 3 lb. timothy, 3 lb. red clover, and 3 lb. white clover, and the rye-grasses in the following quantities:—

	1. lb.	2. lb.	3. lb.	4. lb.	5. lb.
Perennial Rye-grass	20	15	10	5	0
Italian Rye-grass	0	5	10	15	20

It will be seen that perennial rye-grass was substituted for Italian rye-grass. In February, 1910, moss-dung litter at the rate of 15 tons per acre was applied to part of each plot. After cutting, samples of the hay of each plot were taken, the grasses and clovers separated out and weighed, and the percentage of each calculated. From these the weights in cwts. per acre of grasses and clovers were estimated, and are shown in the following table :—

With dung :—

		¹ Cwt.	² Cwt.	³ Cwt.	⁴ Cwt.	⁵ Cwt.
Grasses	...	37	39	37	37	38
Clovers	...	23	19	13	10	7
Total	...	60	58	50	47	45
Without dung :—						
Grasses	...	18	19	24	21	27
Clovers	...	26	21	15	12	11
Total	...	44	40	39	33	38

It will be seen that as the proportion of Italian rye-grass in the mixtures increased, so the proportion of clover in the crop decreased. This was the case both with and without manure, though in every case the effect of the dung was slightly to reduce the clover and to increase the grasses. The Italian rye-grass also appeared to have a similar effect on cocksfoot and timothy as on the clover, the quantity diminishing with the increased use of the Italian seed.

Change of Seed in Oat-growing (*Cumberland and Westmorland Farm School, Newton Rigg, Ann. Rept., 1909-10*).—Irish-grown seed oats of the Waverley variety was tried in comparison with home-grown seed of the same variety with a view to ascertaining whether, as in the case of potatoes, there is any advantage in a change of seed. The crops from local seed were $141\frac{1}{2}$ stones of grain and 27 cwt. of straw, and from Irish seed $112\frac{1}{4}$ stones of grain and 22 cwt. of straw. As in other trials with oats, no advantage from a change of seed was shown.

Experiments with Potatoes (*Edinburgh and East of Scotland College of Agric., Report XXIV*).—Variety trials.—These were carried out on a medium loam, 400 ft. above sea-level. Two new varieties, Eclipse and Edina, were tried in 1910 against Mid-Lothian Early and Sharpe's Express, the two latter having given good results among first early varieties in former experiments carried out by the College. Both the new varieties gave good yields, and Edina was promising as regards quality. Among second earlies, Queen Alexandra (a variety indistinguishable from King Edward) and Aberlady did well. The late varieties included a selection from Dalmeny, namely, Helium, A 1, Beauty, Regent, and Bountiful; most of these did very well. Northern Star was retried after several years, and found to be greatly improved in quality, while the yield was high. Two plots were planted with President, a Dutch variety, which was claimed to be a good cropper and more resistant to disease than the older Up-to-Date types. The first plot planted with seed imported in 1909 and grown that year produced a healthy, vigorous plant yielding over $10\frac{1}{2}$ tons per acre. The second, planted with seed imported in 1908 and grown in 1908 and 1909, failed completely from disease. Among other late varieties Rising Sun did well and White City badly.

Effect of Change of Locality.—Seed of Up-to-Date obtained from Boon, in Berwickshire (elevation of 900 ft.), Leadburn, in Midlothian (800 ft.), and Deskford, in the lower district of Banffshire, gave better results than seed from the low district of East Lothian, the seed from these four sources being planted at seven centres in different districts. The North Country seed (Banff) did best, but the results indicate that nearly the same advantage can be obtained by securing seed from a high-lying district.

LIVE STOCK AND FEEDING STUFFS.

Soy-bean Cake as a Food for Cows (*Cumberland and Westmorland Farm School, Newton Rigg, Ann. Rept., 1909-10*).—Three cows and three heifers after their first calf were used in this trial, which lasted for twelve weeks. They were all at an early stage of their milking period, and, as the milk naturally declined in quantity in the course of the trial, it was decided to feed soy-bean cake during the first and last three weeks, and decorticated cotton cake, with which it was compared, during the middle six weeks. The daily ration of each cow was : 49 lb. swedes or 42 lb. mangolds, 14 lb. hay, 7 lb. oat straw, 4 lb. crushed oats, and either 4 lb. soy-bean cake or 4 lb. decorticated cotton cake. The results on the milk yield were :—

		Gallons of milk produced.	Percentage of butter fat.
First three weeks (soy-bean cake)	...	315	3'7
Middle six weeks (decorticated cotton cake)	...	527	3'9
Last three weeks (soy-bean cake)	...	225	4'1

The total milk yield with soy-bean cake was thus 540 gallons, and with decorticated cotton cake 527 gallons, the average percentage of butter-fat being the same with both kinds. The cows lost weight slightly in the early weeks when giving their largest quantity of milk, but gained towards the end.

Linseed Cake for Milking Cows (*Cumberland and Westmorland Farm School, Newton Rigg, Ann. Rept. 1910-11*).—Linseed cakes containing respectively 12 per cent. and 7 per cent. of oil were fed to six cows. As the milk naturally declined in quantity during the trial, which lasted for eight weeks, the rich cake was fed in the first and last periods of two weeks, and the poorer cake in the middle four weeks. The daily ration of each cow was 35 lb. swedes or mangolds, 14 lb. hay, 7 lb. oat straw, 3 lb. crushed oats, and 5 lb. linseed cake. A total yield of 441 gallons was obtained with the 12 per cent. cake and 438 gallons with the 7 per cent. cake. The carcass weight of the cows appears to have been affected by the quality of the cake, as they gained 9 stones 6 lb. during the first fortnight, and 9 stones 7 lb. during the last fortnight with the 12 per cent. cake, but lost 5 stones 7 lb. in the four weeks with the 7 per cent. cake.

Winter Fattening of Mountain Sheep (*Cumberland and Westmorland Farm School, Newton Rigg, Ann. Repts., 1909-10 and 1910-11*).—In the year 1906 a commencement was made in feeding trials with Herdwick sheep. These trials have been repeated each year since, and have been extended to Cheviots, Scotch Blackface, and Greyface sheep. The object has been to see if winter fattening of mountain sheep on pasture land could be successfully and profitably followed, and to what extent these

sheep would stand the good feeding usually given to the larger and quieter breeds of sheep. The plan adopted at first was to run the sheep on the pastures with a rack of hay, and occasional swede-tops, to the end of December, then to supply daily cut swedes in troughs, and early in February to commence corn and cake feeding at the rate of $\frac{1}{2}$ lb. oats and $\frac{1}{2}$ lb. linseed cake to every 3 hoggs. Under this treatment the sheep were clipped, and sold fat about the end of June. In each year following, the pace has been quickened by commencing the trough-feeding earlier than in the previous year, with the result that in 1910 the sheep had all been sold fat by the end of April, and with no more losses than occurred in the earlier years under slower feeding. The following table gives the average results for the whole period :—

	Cost.	Weeks kept.	Sold for.	Cake and Corn.	Gross Profit.	Return for Grass, Hay, and Swedes. Per Week.
Herdwicks (4 years)	s. d.		s. d.	s. d.	s. d.	d.
Blackface (3 , ,)	10 8	30	31 2	2 4	18 2	5·7
Cheviot (3 , ,)	15 8	22	30 9	1 11	13 2	7·2
Greyface (2 , ,)	13 3	25 $\frac{1}{2}$	28 6	2 6	12 9	6·0
	14 7	18 $\frac{1}{2}$	32 8	1 10	16 3	10·5

Cross-breeding for Fat Lambs (*Cumberland and Westmorland Farm School, Newton Rigg, Ann. Rept., 1909-10*).—The results obtained on an average of seven years' trials in breeding from cross-bred ewes are shown in the following table :—

Cross.	Number of lambs per seven ewes.	Average age when fat for market.	Average live weight.	Average selling price.	Price per lb.
<i>Border Leicester Ram—</i>		Weeks.	lb.	s. d.	d.
Ewe					
Cheviot—Border Leicester ...	14	14	75	32 11	5 $\frac{1}{4}$
Blackface—Border Leicester ...	13	12 $\frac{1}{2}$	76	33 7	5 $\frac{3}{4}$
Blackface—Wensleydale ...	12	14 $\frac{1}{2}$	82	33 8	5
<i>Oxford Down Ram—</i>					
Ewe					
Cheviot—Border Leicester ...	12	13	78	37 4	5 $\frac{3}{4}$
Blackface—Border Leicester ...	13	11 $\frac{1}{2}$	73	36 1	6
Blackface—Wensleydale ...	13	14 $\frac{1}{2}$	82	34 6	5
Herdwick—Border Leicester ...	11	13 $\frac{1}{2}$	78	35 9	5 $\frac{1}{2}$
<i>Wensleydale Ram—</i>					
Ewe					
Cheviot—Border Leicester ...	12	15	89	36 0	4 $\frac{7}{10}$
Blackface—Border Leicester ...	11	15 $\frac{1}{2}$	89	35 0	4 $\frac{5}{6}$
Blackface—Wensleydale ..	11	16	89	34 0	4 $\frac{5}{10}$

As soon as a lamb reached 70 lb. it was sent to the market if fat. It will be seen that the Wensleydale cross lambs were slowest in getting fat, though rapid growers; they are therefore better adapted for feeding for mutton than for lamb. The Cheviot—Border Leicester ewe appears to have been the most prolific. The Oxford Down—Blackface—Border

Leicester lambs were fit for the butcher at the earliest date, and consequently realised most per pound. The Herdwick—Border Leicester ewe has only been tried two seasons, but when crossed with the Oxford Down ram the lambs produced have shown fine quality and have matured quickly.

WEEDS, AND INSECT AND FUNGUS PESTS.

Growth of Tobacco for the Extraction of Nicotine (*Jour. Dept. of Agric. for Ireland, July, 1911*).—The use of nicotine as an insecticide and sheep-dip is at present restricted by the high price, and it is stated in the above Journal that the demand has now reached such dimensions that all available waste tobacco of sufficient strength is used for nicotine production, and the manufacturers are seeking for a more extensive and reliable source of supply than is afforded by the waste tobacco from factories and warehouses, which, during periods of scarcity, commands good prices for smoking purposes. An article on the growth of tobacco for the purpose in England appeared in this *Journal*, August, 1911, p. 378.

The Irish Department of Agriculture in 1910 grew an acre of tobacco specially for nicotine extraction, with the following financial results :—

	<i>Expenditure.</i>			
				<i>£ s. d.</i>
Seeds, beds, preparation of land and manures	7 15 7
Planting and cultivation	2 14 5
Harvesting	2 0 0
Curing	2 10 0
Stripping, baling, and packing	2 0 5
Marketing	0 10 0
Rent, rates, and taxes	1 3 0
Total	<i>£18 13 5</i>

	<i>Receipts.</i>			
				<i>£ s. d.</i>
1,271 lb. tobacco, sold at 3d. per lb.	15 17 9
Loss	<i>£2 15 8</i>

The species *Nicotiana rustica*, which has a specially high nicotine content, and yellow Pryor were grown, but the crop was cured and handled in the ordinary way for smoking tobacco. The results show that it is not commercially profitable to do this, for the reason that it thereby costs nearly as much to grow tobacco for nicotine as for smoking purposes, while a higher price can be obtained for smoking tobacco. A preliminary test was made with a view to reducing the cost of production by omitting the usual operations, curing, stripping, &c., which follow harvesting, and it is intended this season to make an experiment in producing tobacco extract directly from fresh leaves, and then selling the extract instead of the cured leaves to the nicotine manufacturer.

It should be noted also that the season was very unfavourable, the tobacco having to be harvested prematurely. As a result the nicotine content was lowered.

Potato "Leaf-Blotch" and "Leaf-Roll" (*Jour. Roy. Hort. Soc.*, Vol. 36, Pt. III., May, 1911).—In 1908-10 Mr. A. S. Horne found in Scotland three outbreaks of a leaf-blotch disease, all of which appeared in crops raised from seed potatoes of the President variety brought from the Continent. The blotches had a dark brown centre, surrounded by a margin of a lighter shade, and in the examples examined, which were all of a late stage of the disease, it worked its way from the surface of the leaves into the more deeply seated tissue. This is in contrast to the ordinary leaf-curl disease, due to *Macrosporium solani*, in which the fungus reaches the leaves last. The diseased plants were stunted, with yellowish foliage and blotched leaves, sometimes half-folded or curled, and, when lifted, the tubers were few and very small. From this crop tubers of large size, and therefore from apparently healthy plants, were chosen and planted, but the disease was quite as bad, while when the small ones were used practically no crop was obtained.

A number of plants with curled or rolled leaves were also observed by Mr. Horne in Durham, and, on lifting, were found to be affected with Blackleg.

Potato Blight (*Phytophthora infestans*) (*Scientific Proc. Roy. Dublin Soc.*, Vol. XIII., No. 2, March, 1911).—Considerable uncertainty exists as to the manner in which potato plants first become infected with *Phytophthora infestans* in each succeeding season, and in the absence of resting spores, capable of living over the winter, it has been supposed that diseased tubers containing the mycelium must be the source from which the blight starts anew in any given season. These experiments were carried out to ascertain whether the plants become infected in the field directly from the planted tubers by means of mycelium and not by spores.

Six potato tubers infected with *Phytophthora* and six healthy tubers were halved, thus making twenty-four sets. These were planted in pots, of twelve of which the soil had previously been sterilised. The soil in each case was virgin loam not previously used for potting, and no manure was used. Three pots containing diseased sets in sterilised soil were placed under conditions extremely favourable to the development of *Phytophthora*, three pots containing healthy sets in sterilised soil being used as controls. Two of the diseased sets produced plants absolutely free from *Phytophthora*, while the third rotted away in the soil.

The remaining eighteen sets were placed under conditions less favourable to the growth of the fungus. Of the nine diseased sets, six produced plants, one of which was infected with *Phytophthora* and removed. Subsequently eight of the nine healthy plants which had been produced from the nine healthy sets, and four of the plants from the diseased sets, became infected with the blight, it being practically certain that infection was brought about by the spores set free from the diseased plant before its removal. The two remaining plants, one from a healthy set and one from a diseased set, were kept for some time longer under conditions favourable to the blight, but did not become infected.

A further experiment was carried out during the summer of 1910 in Co. Galway. Of 132 uncut tubers attacked by *Phytophthora* planted

as sets, 53 produced plants which showed no signs of infection with the blight until about thirteen weeks after planting, when the disease was found as isolated spots on the leaflets indicating an attack by spores from a neighbouring diseased plot. It does not seem possible that the blight could have arisen from internal mycelium, as the parts of the plants other than the leaflets were quite healthy. The new tubers, moreover, were in every case found to be quite healthy.

It is concluded that there is no evidence to support the view that the recurrence of the potato disease, year after year, is due to the migration of dormant *Phytophthora* mycelium in or into apparently healthy plants.

HORTICULTURE, CIDER, AND HOPS.

Processes of Cider-making (*Nat. Fruit and Cider Inst. Rept.*, 1910).—
Washing of Vintage Fruit.—The cider-making season of 1909–10 was considered a suitable occasion, owing to the unfavourable character of the season and the unsatisfactory condition of the fruit available, for testing the effect of washing the fruit before milling. Almost the whole of the fruit used was washed—first in a large tub, and then in a sloping wooden trough, the bottom of which consisted of laths $\frac{3}{4}$ in. apart. The amount of dirt, decaying leaves, &c., removed from the fruit was remarkable, but, on the whole, no very striking results as regards the cider were produced in the case of fruit in reasonably good condition. With two ciders made from fruit in good condition, one-half of which was washed and the other unwashed, a difference in the flavour could only be detected as the season advanced, when the flavour of that from the washed fruit became slightly cleaner. There was an absence of taint in the ciders and less “sickness” than usual, but this may not have been due to the washing. Washing was, however, undoubtedly of service where the fruit was in a bad state, and the practice might profitably be adopted as a preventive of taint by those who have large quantities to deal with, and accordingly are not able to ensure such good general condition as those who handle smaller quantities.

Maceration of the Pomace.—Further experiments have been made to ascertain the reason of the value of allowing the pomace to stand some time after milling before it is pressed, and former results have been confirmed, viz., that there is no material increase in the amount of sugar in the juice. Accordingly, the explanation has been sought in other directions. No striking changes are produced in the amounts of acid and tannin in the juice, and the natural rate of fermentation is also not much directly affected. A consequence, however, of allowing the pomace to stand, or maceration—as it may be called—is that a larger quantity of mucilaginous or pectic substances becomes dissolved in the juice. Some of these substances are later deposited in flocculent, or clot-like forms, and act as a natural clarifying agent, and it is suggested that the advantage of maceration is due to the heavier and more flocculent deposit in the juice from macerated pomace and the more thorough and quicker clearing. If this is so, the value of the process may be less since the introduction of the filter. It was found, however, that ciders made from macerated pomace could be filtered at an earlier stage of fermentation and more thoroughly than others, and this may be of considerable value in dealing with rapidly fermenting ciders,

where filtration is usually ineffective. This effect was demonstrated with Morgan Sweet apples, one of the most difficult varieties to deal with on account of rapid fermentation.

Sulphuring.—The effect of sulphuring has been elucidated in three directions, its action in checking fermentation, and in weeding out the organisms present, with the suppression of undesirable yeasts, acetic bacteria, and the bacilli of cider sickness. From these investigations it is concluded that sulphuring should not be considered a satisfactory practice for the preparation of sweet cider, since, if fermentation is to be checked sufficiently and not merely temporarily, an objectionably heavy dose is necessary in the case of rapidly fermenting juices, and in the case of juices with slower rates of fermentation there are other and less questionable means of checking fermentation. There are, however, possibilities in other directions in favour of a light sulphuring of the fresh juices. A purer type of fermentation, and therefore a superior product, may be found to result, and considerable assistance in the natural clarification of the ciders may be obtained.

Blossoming and Pollination of Fruit (*Cecil H. Hooper, Jour. Roy. Hort. Soc., Vol. 36, Pt. III., May, 1911.*)—This paper contains notes made at Wye, Kent, on the date and duration of blossoming of nuts, fruit trees, and small fruit in 1908-10, and on the sterility or fertility of varieties when self-fertilised, and the part played by insects in pollination. Most of the substance was included in the articles on the subjects in this *Journal* for December, 1908, p. 678; April, 1910, p. 32; and April, 1911, p. 24, the dates of flowering in 1910 being added.

OFFICIAL NOTICES AND CIRCULARS.

A Departmental Committee was appointed by the Secretary for Scotland and the President of the Board of Agriculture in June, 1910,

**Report of the
Committee on
Fairs Prices.**

to inquire into the present system of striking Fairs Prices in Scotland, and to report whether the procedure of Fairs Courts can be amended so as to ensure that the annual value of corn and other produce shall be ascertained on a more uniform basis and with greater accuracy; and, if so, what are the best means of attaining that object.

The Report of this Committee (Cd. 5763; price 1½d.) has now been published, and contains the recommendations of the Committee on the subject.

These scholarships have been established by the Board of Agriculture and Fisheries in order to train promising students under suitable

**Research
Scholarships in
Agricultural Science.**

supervision, with a view to their contributing to the development of agriculture, either by carrying out independent research, or by acting in an advisory capacity to agriculturists. They will be granted only to students who show distinct promise of capacity for advanced study and research in some one of the sciences bearing on agriculture.

Twelve scholarships will be awarded in October next if so many suitable candidates present themselves.

The scholarships will be of the annual value of £150, and will be tenable for three years, provided that satisfactory reports are made at the end of each year as to the conduct and capacity of the holder by the authority under whose supervision the scholar is placed by the Board.

Scholars must be prepared to work under such supervision as the Board may prescribe, and at an institution selected by the Board affording facilities for research in one of the following subjects:—

1. Plant Physiology.
2. Plant Pathology.
3. Genetics.
4. Plant Nutrition and Soil Problems.
5. Animal Nutrition.
6. Animal Pathology.
7. Bacteriology, with special reference to Agriculture.
8. Zoology do. do.
9. Economics do. do.

A scholar will not be permitted to engage in other work, except under such conditions as the Board may direct.

The amount of the scholarship will be paid in quarterly instalments, and the scholarship will commence as soon after the award as arrangements can be made for placing the successful candidate at an institution.

A scholar will be entitled to such vacations as may be accorded him by the authority under whose supervision he is placed, but the aggregate absence in any one year is not to exceed two months.

The scholar will be required, as a general rule, to spend some part of the three years at an approved Continental laboratory or university.

An applicant for a scholarship must be (*a*) a graduate of a university, or (*b*) the holder of a diploma of a university or college of university rank. He must be nominated, on the form provided, by a professor or lecturer of a university or college of university rank. Nominations must be received not later than September 23rd next.

The Report (Cd. 5871; price 1½d.) of the Departmental Committee appointed by the President of the Board of Agriculture and Fisheries

Report of the Committee on Grouse Disease. in 1905 to inquire into the nature and cause of grouse disease has been recently issued as a Parliamentary paper.

The work of the Committee was carried on with the aid of a number of scientists, who were asked to assist in the investigation, and of a body of local correspondents in different parts of the country.

In 1905 and 1906 the stock of grouse was remarkably healthy, and an excellent opportunity was given of studying the bird under normal conditions. An outbreak of considerable mortality among grouse in 1907 enabled data to be collected of the disease, especially as regards the lingering or pining form of the disease, which has since been traced to the ravages of the threadworm *Trichostrongylus pergracilis*. In 1908 the research stage of the investigation was reached, and the follow-

ing special points were studied: (1) The life-history of the *Trichostrongylus pergracilis*, which the Committee believed to be the immediate cause of "grouse disease"; (2) the life-history of the other internal parasites of grouse; (3) the protozoal parasites infecting the alimentary tract and blood of grouse; (4) the bacteriology of grouse; (5) the various insects found on the moors, both from the point of view of insect-borne disease and from the point of view of food; and (6) the questions affecting the food supply of grouse.

As a result of the investigation a large amount of material of scientific and general interest has been collected, which the Committee have published in two volumes entitled "The Grouse in Health and in Disease." This book is published by Messrs. Smith, Elder and Co.; price £2 2s.

The Committee consider that although their immediate object has been achieved, viz., the elucidation of the causes of "grouse disease," the present inquiry has scarcely crossed the threshold of the investigation into the general pathology of birds, and there is still a large amount of work which might profitably be undertaken.

The Board of Agriculture and Fisheries withdrew as from Wednesday, August 23rd, all the restrictions which were imposed by them on

**Outbreaks of
Foot-and-Mouth
Disease.** the movement of animals in connection with the recent outbreak of foot-and-mouth disease at Udimore, near Winchelsea, Sussex.

The existence of foot-and-mouth disease among animals at Grange Farm, West Hallam, Derbyshire, was confirmed on August 25th after an examination of the affected animals by the Chief Veterinary Officer of the Board. The usual precautions were taken to prevent the spread of the disease, and the Board ordered the slaughter of all the animals on the premises. An Order has been issued prohibiting the movements of animals in a large area surrounding the infected farm.

In conformity with the wishes which have been expressed by members of Parliament on both sides of the House and by representatives of some of the leading agricultural societies,

**Departmental
Committee on
Foot-and-Mouth
Disease.** Lord Carrington determined some time ago to appoint a Departmental Committee to inquire into the circumstances of the recent outbreaks of foot-and-mouth disease, and to

consider whether any further measures can be adopted to prevent their recurrence. The Committee will be a Departmental one in order to enable representatives of the leading agricultural societies to be nominated as members. It will be appointed and sit in the autumn, when it is hoped that the country will again be free from infection, and that the exceptional pressure upon the staff of the Board which has been occasioned by reason of the recent outbreaks will have ceased.

Lord Carrington invited Mr. Walter Long to act as Chairman of the Committee, but, owing to the pressure of other important duties, Mr. Long was unable to accept the invitation, and Sir Ailwyn Fellowes has now consented to occupy that position.

The Board have recently published the following new leaflets :—
No. 242, Bacteriosis of the Potato and Tomato; No. 245, Crown-Gall; No. 246, Prevention of Damage to Hides, Skins, and Wool; No. 248, The Sclerotinia (*Botrytis*) Disease of the Gooseberry, or "Die-back"; No. 249, "Couch" or "Twitch"; No. 250, Fruit-Bottling for Small Holders; No. 252, Pruning Fruit Trees; No. 253, Isle of Wight Bee Disease.

New editions of the following leaflets are now being issued, the information in a number of them having been substantially revised :—

No. 30, *The Codling Moth*.—Information as to spraying revised.

No. 45, *The Starling*.—Notes on the food of nestlings added.

No. 66, *Fowl Cholera*.—This leaflet has been re-written.

No. 74, *The Composition and Properties of Concentrated Feeding Stuffs*.—This leaflet, originally known as "The Purchase of Feeding Stuffs," has been rewritten, and now consists of 22 pages dealing with the general composition of foods, the digestibility of foods, the productive value of the digestible matter of foods, the manurial ingredients in foods, and the comparative value of foods. It also contains an account of the chief feeding stuffs.

No. 118, *The Sheep Nostril Fly*.—This leaflet now contains a new illustration.

No. 128, *Advice to Beginners in Bee-keeping*.

No. 141, *The Preparation of Honey for Market*.

No. 146, *The Value of Records of the Milk Yield of Cows*.—This leaflet, formerly "Tests for Farmers' Milk," has been rewritten, and is now an eight-page leaflet dealing with simple records of milk yields, testing milk for butter-fat, farmers' milk tests at collegiate institutions, instructions for taking samples, co-operative societies for milk-testing, and the value of milk records to the dairy farmer, with a list of institutions which undertake milk-testing for farmers.

No. 164, *Potato Leaf-Curl and Black-Stripe of Tomatoes*.

No. 170, *The Uses of Lime*.—The statement as to the composition of basic slag has been amended.

No. 173, *Potato-Growing*.—Originally issued as "Potato-Growing in Yorkshire," this leaflet has been extensively revised, and now comprises eleven pages dealing with the questions of seed-tubers, storing of seed, choice of variety, manuring, planting, harvesting, and storing.

No. 195, *American Gooseberry Mildew*.

No. 202, *The Frit-Fly*.

No. 207, *Strawberry Cultivation*.

No. 225, *The Septoria Disease of Tomatoes*.

No. 244, *The Destruction of Rats*.

Copies of any of these leaflets may be obtained free of charge and post-free on application to the Secretary, Board of Agriculture and Fisheries, 4 Whitehall Place, London, S.W.

**County Committees for
the Encouragement
of the Horse-breeding
Industry.**

Lists of County Committees for the encouragement of the horse-breeding industry were given in this *Journal* for April, May, June, and July. The following further additional committee has since been appointed:—

Surrey.

The Hon. Henry Cubitt, Dorking.

Sir Thomas Skewes-Cox, The Manor House, Petersham, Surrey.

A. W. Chapman, 51 Whitehall Court, London, S.W.

J. Hutchinson Driver, Melrose, Horsell, Woking, Surrey.

C. G. Leveson-Gower, Titsey Place, Limpsfield, Surrey.

Edward Murray, The Old Cottage, Mickleham, Dorking.

Secretary, Edward Murray, The Old Cottage, Mickleham, Dorking.

The Board have recently issued a Report (Cd. 5,689. Price 4½d.) for the year 1910 on the business falling within the scope of the (1) Tithe

**Report on the
Proceedings of the
Board under the Tithe
and other Acts.**

and Copyhold, and (2) Commons and Survey Branches of the Department. This includes the proceedings of the Board under the Tithe, Copyhold, Inclosure, Commons, Land Drainage, Light Railways, and other Acts.

An extract from the report relating to recreation grounds allotted under the Inclosure Acts will be given in next month's *Journal*.

MISCELLANEOUS NOTES.

Demand for Agricultural Machinery and Fertilisers in Russia.—H.M. Consul at Moscow (Mr. Grove), in reporting on the trade of that district

Demand for Agricultural Machinery Abroad. in 1910 (*F. O. Reports, Annual Series*, No. 4,690), states that as a result of the satisfactory conditions of the agricultural industry in 1910 there was a rise in the demand for agricultural machinery and implements as compared with 1909. The Zemstvo returns are reported to show that the increased demand of 1910 in the central districts of Russia was 8 per cent. higher for harvesting machinery, and 10 per cent. higher for other agricultural machinery, than in the previous year, and in the Volga district 27 per cent. higher for harvesting machinery, and 32 per cent. for other agricultural machinery. The same tendency is observable in the demand for artificial fertilisers, which were used over an increased area in the central agricultural districts and elsewhere.

H.M. Consul-General at Odessa also reports an increase in the trade of agricultural machinery in that district in 1910, in spite of the failure of the harvest in Western Siberia, where large stocks of machinery have remained unsold. As a result of competition, British sellers are being compelled to give long credit in the same way as German firms. This new style of doing business is much more troublesome than the old, as the business of banker has to be added to that of manufacturer; but at the same time it seems to meet the necessities of the situation.

The manufacture of agricultural machinery in the country itself has made steady progress, having advanced from £720,000 in value in

1904 to £4,200,000 in value in 1909. It is a very hopeful sign that improved methods of agriculture are being so widely introduced and that the Government are giving the peasants such effective help in purchasing agricultural machinery. Small credit associations continue their prosperous activity under the control of a special Government Department. They number at present 11,768, with a capital of about £26,243,386. These credit associations, in conjunction with the peasants' co-operative societies, are assisting in the introduction of agricultural machinery, the purchase of seeds, manure, cattle, and land, and also in the sale of grain.

Live Stock and Agriculture in Egypt.—Steps are being taken with a view to improving Egyptian cattle, but it does not appear that the *working* qualities of Egyptian oxen are likely

Notes on Agriculture Abroad. to be improved by importation. At present the yield of milk from the native cow, however, is less than half the average of a European cow, while milk is sold retail in Egypt at more than double the price obtainable in the United Kingdom; there is, therefore, an undoubted opening for dairy farmers who would give their attention to a separate milking breed.

With regard to horses, the importation of British stallions gives promise of success. The Turkish Government has now forbidden the importation of mules, and has restricted the importation of horses from Syria and other Ottoman territories. Consequently the value of horses is rising, and there will probably be an opening in the near future for the importation of considerable numbers of European horses.

As regards progress in agriculture generally, a separate Department of Agriculture, attached to the Ministry of Public Works, has been created by Khedival Decree, and commenced work in January, 1911. Special attention has been paid to manurial experiments and the growing of various vegetable and seed crops, with a view to supplying sound seed at moderate rates. There is a good prospect for seed firms in Egypt, the climate being dry and suitable for the production of excellent seed. The local demand is considerable, and an export trade could soon be established.

The cultivation of fruit and vegetables is developing rapidly, and it is stated that there is an opening for more British enterprise in the direction of planting large areas of land with timber and fruit trees with a view to supplying local demands and developing export trade.

Some progress has also been made in the direction of agricultural education. Three agricultural sections of trade schools have been formed, and it has been decided to create four practical farm schools. The necessity for establishing an agricultural college in Egypt was recognised by the Egyptian Government in 1890, when the School of Agriculture was opened at Giza with 59 selected students. Last year no less than 174 applied for admission, and 196 students are now attending the courses there, instruction being now given partly in the Arabic language.

The value of co-operation is becoming, to some extent, recognised by the smaller farmers in Egypt, and a number of agricultural syndicates

have been started in various districts throughout the country (*F.O. Reports, Annual Series*, No. 4726).

Establishment of a Service for the Inspection of Plant Diseases in France.—A Presidential Decree was issued on May 1st, 1911, under powers conferred by an Act of December 16th, 1910, creating a service for the inspection of plant diseases in France. The service will have two sections—entomological and cryptogamic—and will be under the direction of the Ministries of Agriculture and Finance. Inspection will be conducted by travelling inspectors on the application of horticulturists to the Ministry of Agriculture, and certificates as to freedom from diseases will be issued if the result of the inspection is satisfactory. No responsibility, however, will be undertaken by the service for the acceptance by foreign countries of consignments accompanied by such certificates. The expenses of inspection will be repayable by the horticulturists, whether such certificate has been granted or not, partly by a fixed annual charge of £1 for every plantation under inspection, and the deficit remaining will be covered by a charge in proportion to the market value of the produce in respect of which an application for certification has been made. In the absence of information necessary to calculate such charge, the contributions of horticulturists will be fixed by the Ministry of Agriculture. (*Journal Officiel*, May 13th, 1911.)

Proposed Standard for Roumanian Wheat.—The following information is from the report by H.M. Consul at Bucharest (Mr. E. MacDonell) on the trade of that district in 1910:—

Owing to the fact that large quantities of Roumanian wheat are annually shipped to Rotterdam and Antwerp, where they are mixed with Russian, Hungarian, and Bulgarian wheat of inferior quality, and subsequently sold on the British market under the name of Danubian wheat, the local merchants and exporters have decided to hold a conference in London with the object of establishing a standard for Roumanian wheat. It is maintained that if pure Roumanian wheat were sent direct to the British market it would command higher prices owing to its quality, and the intermediate profits of the Rotterdam and Antwerp merchants would be divided between the British and Roumanian principals. It is expected that this conference will take place in London during 1911. (*Board of Trade Journal*, June 8th, 1911.)

Progress of Agriculture in Greece.—Much benefit is expected from improved administration of agricultural affairs in Greece. A Ministry of Agriculture and Commerce was recently established, and agriculture is being benefited also by the work of the Agricultural Society of Greece. To improve the native breed of horses, stallions belonging to this society have been stationed at different centres throughout the country; agricultural experimental stations have been established; a programme has been arranged for having the rudiments of agriculture taught in the village elementary schools; and the spraying of vines, &c., for protection against mildew is being promoted by the sale, at a low price, of high-class British sulphate of copper, the distribution being done through the medium of the monopoly offices throughout the country (*F.O. Reports, Annual Series*, No. 4750).

Forest Reserves in Canada.—Under the Dominion Forest Reserves

and Parks Act, which received Royal Assent on May 19th, 1911, certain lands in Canada are scheduled and set apart as Forest Reserves for the growth of timber, the conservation of minerals, the protection of animals, birds, and fish, and the maintenance of conditions favourable to a continuous water supply.

The control or management of the reserves is vested in the Director of Forestry, subject to the direction of the Minister of the Interior.

The Act provides for the appointment of rangers and the expropriation of any land within the reserves not vested in the Crown.

Provision is made to allow of the building of necessary public roads, and the holders of licences to cut timber are protected.

During the construction of railways the Minister may appoint fire rangers to protect the adjacent forest from fire, one-half the cost of such fire ranging to fall on the constructors of the railways. The ranger is given extensive powers to enforce the provisions of the Act.

The Governor in Council may make regulations for the proper utilisation of the reserves, including the cutting of timber, working of mines and natural sources of power, preservation of game, and protection against fire.

The Governor in Council may proclaim areas within the reserves as Dominion Parks, which shall be maintained as public parks and pleasure-grounds. Parts of these parks may be made available for building purposes.

The Schedule shows that 25 forest reserves are established, aggregating 25,200 square miles. Of these, 9 reserves, totalling 2,115 square miles, are in British Columbia, 5 reserves (3,584 square miles) in Manitoba, 7 reserves (937 square miles) in Saskatchewan, and 4 reserves (18,564 square miles) in Alberta.

Importation of English-Grown Sugar Beet into Holland.—A report by H.M. Consul at Rotterdam (*F.O. Reports, Annual Series*, No. 4654) states that, in view of the experiments being made in the United Kingdom with the cultivation of beet for sugar-producing purposes, it is of interest to note that several ship-loads of British-grown beet arrived at that port in 1910, destined for inland tinned milk and sugar factories; the crop of Dutch beet not having been equal to the demand, these factories have had to look to another source of supply.

H.M. Consul adds that the cost of railway freight in the United Kingdom and the sea carriage to the Netherlands so enhance the final value of the beet that its importation into the Netherlands in normal times would not be feasible, and only when the factories are at their wits' end to find the supplies they require will they turn to the United Kingdom to make up the deficiency; whether further shipments will be ordered will also depend on the value of the British beet on the market as a sugar-bearing root.

Agriculture in Argentina in 1910.—H.M. Minister at Buenos Aires, in reporting on the condition of agriculture in Argentina in 1910, states that the year was an unfavourable one both for crops and cattle, owing chiefly to drought. The shortage in the rainfall, which has been severely felt in the southern districts for three years or more, extended more into the south-western camps of the Pampa, where immense damage was done to lands cultivated for a large part in a poor way by emigrants who had no funds wherewith to face a bad season.

The area under cultivation, although said to be only a tenth part of what it will be in the future, is so large that the drought has not affected the whole of it. The district that has suffered most is that of Bahia Blanca, but much of the land in this district has only been forced under cultivation in consequence of the phenomenal results achieved by agriculture in recent years. Not much science is used in cultivation, and even the most rudimentary principles of farming are neglected by the Russian and Syrian immigrants, who till the lands in question. The effect of the drought has, however, been sorely felt in many parts of the country where agriculture is not carried on in such a haphazard fashion.

The grazing interests of the country have also suffered severely, more especially in parts where farms were overstocked with cattle and little forethought shown in making ready for less favourable seasons than have blessed Argentina of late. One of the results of the continued low rainfall has been the disappearance of surface water, which has necessitated the erection of water-wheels on the Australian principle throughout the country devoted to pasture. Water can generally be found at a reasonable depth, from whence it is pumped by means of a wheel turned by the wind and discharged into a reservoir connected by pipes with troughs from which the cattle can drink. To put up a pump costs about £200, which gives some idea of the expense to which cattle-raisers have been put by the disappearance of surface water, such as lakes and streams, throughout the country, a phenomenon which must be due to more than the actual shortage of the rainfall. The increase in the area devoted to the cultivation of cereals and alfalfa is held responsible for this disappearance of surface water, but the phenomenon is just as apparent in the grass districts, where little grain or alfalfa is grown, as in the cultivated parts of the country. Moreover, in many places it has already been found necessary to deepen the wells.

A dispatch of May 1st, 1911, states that the rains of April, which ended the drought, came too late to benefit pasture land. The loss of live stock will continue through the winter, and the effects of this mortality will be felt for some years to come. The effects of the drought were apparent in a restriction of credit by the banks.

Future of the Manchurian Bean Trade.—The question of the probable future output of soy beans from Manchuria is of importance in view of the demand for these beans in Europe and in North America.

A report of the Imperial Maritime Customs of China (II., Special Series, No. 31) in this connection states that it is doubtful whether the cultivation will extend much in the districts where the bean is already grown on a large scale (*i.e.*, Southern Manchuria), as it is too much to hope that the beans will supplant the other crops, such as millet and kaoliang, as far as the conservative Chinese peasant is concerned.

It is in the northern and western districts of Manchuria that the possibility of extension lies, *i.e.*, the districts beyond Petuna, up the Hulan valley, and towards Mergen. The construction of a railway to this vast region is contemplated, and the land is mainly virgin soil, extremely fertile, which offers excellent inducements to immigrants who are now entering Manchuria in greater numbers than formerly, owing to the removal of the Government restrictions.

A promising feature of this extension of the area in a northerly direction is that, at present, the further north the beans are grown the better in quality do they become. The best reports have, in fact, been received of beans grown far above Harbin. It is true that in the districts which lie far north there is always a risk of early frosts descending upon the harvests; but this danger could be averted by cultivating specially selected varieties which mature in the shortest possible period.

Much remains to be effected in the way of improvement of commercial arrangements in connection with the dispatch of the beans at the Manchurian ports.

Effect of Electricity on Sheep Raising.—According to Prof. Silas Wentworth, of Los Gatos, California, his experiments with electric influence on animal and vegetable life at his experimental farm on a ranch near Roseville during the past year have proved that electricity will more than double the production of lambs and greatly increases the yield of wool. A flock of 2,000 sheep was divided, one-half being placed in a field under the power wires of an electric power company, while the other was removed from electric influences.

In the field under the electric power line the production of lambs averaged a fraction over two lambs to each ewe. In the adjoining field where electrical influence was lacking the lamb average was less than one to each ewe. Similar differences were noted in the yield of wool from the sheep in the different fields. The fleeces from the sheep in the electrically-influenced field proved 20 per cent. heavier.

Preparations are being made to plough up both fields and plant wheat, when the effect of the current on the growth of that cereal will be tested. (*F.O. Reports, Annual Series*, No. 4650.)

Live Stock Shows at the Turin International Exhibition.—An International show of cattle and sheep was to have been held in connection with the Turin Exhibition in June last (see

Agricultural Congresses and Exhibitions Abroad. particulars in *Journal* for March last, p. 1032), but had to be postponed, and will now be held in Turin from September 28th to October 2nd, 1911. Classes for pigs have now been added

to the original schedule. An international show of horses will be held at the same time.

An international dairying industry show will also be held in connection with the main exhibition from October 1st to 15th, 1911. There will be classes for milk, butter, and cheese, and for machines, implements, and accessories used in the dairy. There will also be prizes for articles, publications, illustrations, and photographs dealing with the sanitary handling of milk, &c.; for the best system of collecting and distributing milk in populous districts; for dairying associations and organisations, &c.

Further particulars of any of these shows may be obtained from the Secretary, Agriculture and Horticulture Committee, 21 St. James's Square, London, S.W.

The weather over the country generally during the *first week* (July 30th to August 5th) was less settled than at any time since the close

Notes
on the Weather
in August.

of June. Rainfall was largely in excess of the average in most of the western districts, but in the northern, eastern, and central parts of Great Britain there was a general deficiency. Warmth was "very unusual" over the country,

except in England S.W., where it was "unusual"; the excess above the normal amounted to about 7° in England N.E. and E. Bright sunshine was everywhere "abundant" or "very abundant."

In the *second week* the conditions generally were very bright and dry, but slight rain fell occasionally in many parts of Scotland. Warmth was everywhere "very unusual," rainfall "light" or "very light," and sunshine "abundant" or "very abundant." The excess of temperature above the average amounted to as much as 9° in England E.

The weather was again fine and bright during the *third week*, but thunderstorms occurred during the week in a few scattered localities. Warmth continued "unusual" or "very unusual," and rainfall "light" or "very light"; no rain was recorded in the south-eastern counties. Sunshine was "abundant" in England E. and N.E. and Scotland N., and only "moderate" in Scotland E., but over the rest of the country it was "very abundant."

The weather prevailing during the *fourth week* was of an unsettled type. Rain or passing showers occurred on several days, and thunderstorms were experienced in almost all parts of the country, especially over England on the 20th. Over the whole week "moderate" falls of rain were generally recorded, except in England N.E. and Scotland E., where the rainfall was classed as "heavy" and "light" respectively. Temperature as a rule was "unusual," and sunshine "moderate" or "scanty." England N.W., however, enjoyed "abundant" sunshine.

The Reports furnished by the Crop Reporters of the Board on the agricultural conditions on September 1st show that the corn harvest

Crop Conditions
in Great Britain
on September 1st.

was practically completed throughout England, while even in Scotland the bulk of the cereals had been cut by that date. The harvest had everywhere been short, with a very few exceptions in the North-East of England, where rain towards the latter part of the month had caused

some slight delay; and the crops were secured in excellent condition throughout the country. Wheat is undoubtedly the best crop of the year; indeed, it is probably the only important crop which will prove to be above the average of the last ten years. Barley is well below average, and oats still more so, the very dry weather not having been at all conducive to bulk, but the quality of both is reported to be very good. No material change in the prospective quantities to be yielded by these three cereals can be recorded during the month. The prospects of beans and peas have somewhat fallen off during August, and both are very considerably below average, particularly the former. On the whole, although prospects north and south of the Tweed are very similar, yet the reports from Scotland are mostly a shade the more favourable.

Potatoes are now expected to yield less than the average, and their prospects are certainly worse than a month ago. Where lifted, the tubers are generally somewhat small : there is hardly any disease, but second growth is very generally reported throughout the country. Reports from Scotland are more favourable than from England.

Mangolds, like potatoes, have also deteriorated considerably during August, although rain towards the end of the month induced a recovery. They are, however, better than turnips and swedes, which appear to be quite the worst crop of the year. The rain late in the month made a considerable difference in their case, but still a yield fully 10 or 12 per cent. below the average must be looked for. Further good rains are urgently required for all classes of roots.

Hops are the only crop to show any improvement—although that is only a slight one—during the month. Picking had begun by the date of the reports both in the Kent and Worcester districts. The yield is expected to prove but very little below average. In the south-east it would seem to be fully average, but some poor returns are reported from the western counties. The quality is excellent.

Apples are upon the whole a fairly good crop, and although much fruit has fallen prematurely, it does not seem to have done so to quite the extent that was apprehended ; but the crop of both plums and pears is expected to be poor.

The continued dry weather has everywhere burnt the pastures badly ; the late rains effected very considerable improvement, but more moisture is much needed. Live stock have been fairly satisfactory considering these adverse conditions, but it is universally reported that cows are not milking at all well.

The supply of labour has been generally plentiful, the favourable conditions of the harvest allowing of the use of machinery to the fullest extent.

Summarising the reports, and representing an average crop by 100, the appearance of the crops on September 1st indicated yields for Great Britain which may be represented by the following percentages :—Wheat, 103; barley, 96; oats, 92; beans, 91; peas, 94; potatoes, 97; turnips and swedes, 89; mangolds, 94; hops, 99.

The *Bulletin of Agricultural Statistics* for August, 1911, issued by the International Institute of Agriculture, gives the following forecast of

Notes on Crop Prospects Abroad. the present cereal harvest from information received in time for publication on September 2nd.

The countries for which it is possible to give an approximate estimate of the production are as follows :—In Europe : Prussia, Belgium, Denmark, Spain, Great Britain, Hungary (including Croatia and Slavonia), Italy, Luxemburg, Roumania, and Switzerland ; in America : Canada and United States ; in Asia : British India and Japan ; and in Africa, Tunis.

Wheat.—Considerable modification has been made in the estimates of yield in Hungary and in the United States. Hungary is now expected to yield 23,417,000 qrs., while in the United States the estimate has fallen from 87,700,000 qrs. to 83,110,000 qrs. Among countries which have been included this month is Canada, which promises

an increase of 8,265,000 qrs. over last year's output; this country has in a large measure contributed to the improvement in the single numerical statement.

For the group of countries above specified the approximate estimate of the production is 261,410,000 qrs., as compared with an output in the same group of countries last year of 247,500,000 qrs., or 5·6 per cent. above last year's total. The area under wheat in these countries is 4·5 per cent. greater than last year. It should, however, be remembered that these figures may be materially affected by the absence of definite information from several important countries, notably Russia and France, to which further reference is made below.

Barley.—The area under barley in the above specified countries (excluding Roumania, United States, British India, and Tunis) is estimated to be 16,430,000 acres, or nearly 1 per cent. more than last year. The production has increased in a greater proportion than the area, being estimated at 57,709,000 qrs., as against 52,932,000 qrs. last year—an increase of 9 per cent.

Oats.—The addition of the figures for Prussia, Hungary, and Canada has caused a considerable increase in the totals for oats, and the area in the last-mentioned group is 27,319,000 acres, as compared with 26,811,000 acres, or almost 2 per cent. more. The total production is estimated at 117,545,000 qrs., as against 111,474,000 qrs. last year—an increase of 5 per cent.

Rye.—The area under this crop is about the same as last year, but the production shows an increase of slightly more than 1 per cent.

The following supplementary notes are given:—

France.—The first threshings of wheat and rye show that the quality of the grain is excellent. The ears are, in general, fine and well filled. The spring cereals have suffered more from the drought than the autumn-sown crops. Oats have in some districts ripened too rapidly, and the yield will not come up to estimates made at the end of June. The out-turn of cereals generally is reported to be fairly satisfactory; the yield of grain is average, but straw is short.

Austria-Hungary.—The Austrian harvest of wheat, rye, and barley is nearly finished; the quality is good, but the crop has suffered from drought, and the grain is small and light. The maize crop looks poor. In Hungary the outlook for maize is becoming worse, and a total production only two-thirds of that of 1910 is now looked for.

Russia.—The general prospects for the wheat harvest in European Russia are for "about an average crop." The harvest will be "insufficient" or "bad" in the east, but will be "good" in the south-west and in the centre of Russia.

Canada.—The condition of the crops on August 1st, expressed as percentages of a "standard" condition, were as follows:—Winter wheat, 90; barley, 88; oats, 88.

Argentina.—The sowing of autumn cereals is nearly finished, and has been carried out under favourable conditions. The seeds are coming up well, and germination is regular. The area under wheat is estimated at 5 per cent. more than last year, that under oats 12 per cent. more.

Australia.—The sowing of autumn cereals is finished, and was completed under good conditions. The condition of all cereals on August 1st was average.

World's Wheat Crop.—According to estimates published in Beerbohm's *Corn Trade List* (August 11th) and in Broomhall's *Corn Trade News* (August 22nd), the wheat crop of the world is anticipated to be very slightly below the output both of 1910 and 1909. An estimate in Dornbusch's *Evening List* (August 18th) puts the total at a very little more than that of the last two years.

The following table shows the estimated total production as given in each of the above-named publications, with the corresponding figures for 1910 and 1909:—

	Beerbohm.	Dornbusch.	Broomhall.
	Qrs. of 480 lb.	Qrs. of Measure.	Qrs.
1911	438,000,000	460,343,000	427,450,000
1910	443,900,000	458,518,000	429,230,000
1909	439,420,000	453,435,000	429,220,000

World's Hop Crop.—Messrs. John Barth and Son, of Nuremberg, in their report on the Hop Crop and Prices of 1911, dated August 22nd, state that the long spell of dry weather experienced in most of the hop-growing countries has altered to a great extent the fairly promising prospects at the beginning of July, and owing to the general belief that the year's output would be a very small one, there has been a rapid rise in prices both for last year's and this year's hops. Messrs. Barth consider, however, that the year's world crop will not be a failure, and that the total yield will correspond to about a weak medium crop; also that the production will be sufficient to meet the world's requirements, and they are consequently of opinion that recent prices have been too high.

United States.—The Crop Reporting Board of the United States Department of Agriculture gives the condition of crops at harvest as follows:—Spring wheat, 56·7, compared with 63·1 last year and a seven-year average of 77·6; oats 64·5, against 83·3 last year and a ten-year average of 79·5; barley, 65·5 against 69·8 last year and a ten-year average of 83·0 (*Times*, September 9th, 1911).

Germany.—The Imperial Statistical Bureau gives the condition at the beginning of September of oats as 3·0 and potatoes at 3·5 (3= average, 4= small). The September report on the Prussian crops records a great deterioration of all crops, except oats. The latter are now regarded as average, potatoes as a small crop, and sugar-beet, clover, and lucerne as very poor. Apart from sugar-beet, potatoes seemed to have suffered most from the August drought; they will yield but little on light soils, but heavy lands may give an average crop; the conditions appear very similar in the east and west of Prussia.

The following statement shows that, according to the information in the possession of the Board on September 1st, 1911, certain diseases of animals existed in the countries specified :—

Austria (week ending August 9th).

Blackleg, Foot-and-Mouth Disease (8,583 Höfe), Glanders and Farcy.

Belgium (sixteen days ending July 15th).

Anthrax, Rabies, Foot-and-Mouth Disease (4,097 "foyers" in 620 "communes").

Bulgaria (week ending August 6th).

Anthrax, Glanders and Farcy, Rabies, Sheep-pox, Swine-fever, Foot-and-Mouth Disease.

Denmark (month of July).

Anthrax, Foot-and-Mouth Disease (1 case).

France (month of July).

Anthrax, Blackleg, Glanders and Farcy, Rabies, Sheep-pox, Sheep-scab.

Foot-and-Mouth Disease (16,027 "étables" in 2,456 "communes").

Germany (on August 15th).

Glanders and Farcy, Swine-fever, Foot-and-Mouth Disease (37,737 infected places in 5,179 parishes).

Holland (month of July).

Anthrax, Foot-rot, Sheep-scab, Swine Erysipelas, Foot-and-Mouth Disease (12,358 outbreaks in 11 provinces).

Hungary (week ending August 2nd).

Anthrax, Glanders and Farcy, Rabies, Swine Erysipelas, Swine-fever, Foot-and-Mouth Disease (965 "cours").

Italy (week ending July 10th).

Anthrax, Glanders and Farcy, Rabies, Swine Erysipelas, Swine-fever, Foot-and-Mouth Disease (464 cases entailing 39,927 animals).

Montenegro (seventeen days ending June 16th).

Foot-and-Mouth Disease (329 "étables" infected in 17 "communes").

Norway (month of July).

Anthrax, Blackleg.

Roumania (nine days ending August 13th).

Anthrax, Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Swine-fever.

Russia (month of April).

Anthrax, Cattle-plague, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Swine-fever, Foot-and-Mouth Disease (54,714 cases in 1,048 "communes").

Servia (eight days ending August 12th).

Rabies, Sheep-pox, Swine-fever, Foot-and-Mouth Disease (4,271 cases in 12 "arrondissements").

Spain (month of June).

Anthrax, Blackleg, Dourine, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Foot-and-Mouth Disease (4,841 animals), Pleuro-pneumonia, Tuberculosis.

Sweden (month of July).

Anthrax, Blackleg, Swine-fever.

Switzerland (week ending August 20th).

Anthrax, Blackleg, Swine Erysipelas, Glanders and Farcy, Foot-and-Mouth Disease (502 "étables" and 262 "alpages-pâtures" entailing 29,412 animals, of which 140 "étables" and 28 "alpages-pâtures" were declared during the week).

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the demand for agricultural labour in August:—

**Agricultural Labour
in England
during August.**

Employment was generally regular throughout August, the weather being unusually dry.

A short corn harvest and the check given to weeds by the drought caused a smaller demand for extra labourers than is usual at this season of the year. There does not appear, however, to have been any marked surplus in the supply of men, which was, generally speaking, about equal to the demand.

Northern Counties.—Employment was but little interrupted by bad weather in these counties. There was a fair demand for extra labourers for the hay and corn harvests, and for hoeing late turnips, although it was somewhat reduced on account of the short harvest. Several correspondents state that fewer labourers offered for the corn harvest than usual, and in the Longtown Rural District some scarcity of men was reported; but, on the whole, the supply was just about sufficient.

Midland Counties.—Extra labourers were generally able to find regular work in these counties until towards the end of the month, when a number of men became irregularly employed, owing to the early completion of the corn harvest and to there being little or no hoeing required on the root crops. There was usually a plentiful supply of harvesters, though a shortage was reported in the Melton Mowbray (Leicestershire) Rural District. Some scarcity of men for permanent situations was reported in the Bucklow (Cheshire) and the Upton-on-Severn (Worcestershire) Rural Districts.

Eastern Counties.—The corn harvest was completed in an exceptionally short time in these counties, and the corn standing well for the "binder," less labour than usual was required. Except in the North Witchford (Cambridgeshire) and Thingoe (Suffolk) Rural Districts, however, few men were reported as out of employment. The drought rendered little or no hoeing necessary on the root crops, but a fair amount of work was found for men at the conclusion of the harvest for threshing, manure carting, &c.

Southern and South-Western Counties.—Extra labourers were fairly well employed, and mention of any surplus was exceptional in the reports from these counties. The demand, however, was affected by the short harvest and by the small amount of hoeing to be done, although fruit-picking and hop-picking afforded a good deal of employment in certain districts in the latter part of the month. Some scarcity of men for permanent situations was reported by correspondents in the Petworth (Sussex), Chippenham (Wiltshire), Stow-on-the-Wold (Gloucestershire), and Axminster (Devon) Rural Districts.

THE CORN MARKETS IN AUGUST.

C. KAINS-JACKSON.

Two circumstances have made August in the corn trade a memorable month, but no connection exists between them. The one is the early harvest, which has caused the last ten days of the month to be well supplied with new corn—an event rare enough to be chronicled. The other has been the difficulty experienced for the greater part of the month in obtaining delivery of produce purchased. In consequence, extreme reluctance was shown by buyers in completing contracts where delivery could not be guaranteed, and the equal avoidance by owners of grain and flour of contracts to supply produce at a specific date, even where the latter was a fair time in advance.

Wheat.—The transition from old to new crop deliveries has occasioned very little change in average prices. The old crop, though of secondary quality in 1910, has improved and hardened by keeping. The new wheat has come on sale at 34s. to 36s. for white, 32s. to 34s. for red, and been promptly taken up at these terms. What is particularly gratifying about the new crop deliveries is their strength; they are sometimes fit for immediate milling use in an unmixed state, and the secondary lots only need about 25 per cent. of Manitoba or Saxonka added, whereas the proportion of dry and glutinous foreign wheat required a year ago was from 50 to 60 per cent. The sales of British wheat for August exceeded the mean, but the excess was exclusively in the later portion of the month. The imports of August were moderate. Prices ranged from 36s. to 40s. for good Canadian, from 35s. to 37s. for new American red winter, from 32s. to 36s. for Russian, from 34s. to 35s. 6d. for Indian, and from 35s. to 36s. for Argentine. The chief shipping countries sent off the following quantities:—North America, 996,000 qrs.; South America, 785,000 qrs.; India, 540,000 qrs.; Russia, 1,034,000 qrs.; “Europe, S E.” 300,000 qrs.; and Australasia, 347,000 qrs. There were, on the last day of the month, 2,700,000 qrs. on passage to this country—a total closely approximating to average expectations.

Flour.—The top price has been advanced 2s. on the month, but this has little influence on ordinary transactions. Hungarian, the chief confectionery type, is 6d. to 1s. cheaper. The value of Household flour is 1s. up from a month ago, but interest has been mainly concentrated in getting actual delivery; by the close of the month supply from mill to bakery had resumed its normal condition. The shipments of flour for August were much below the mean; 350,000 sacks from North America, 15,000 sacks from Australia, and 10,000 sacks from the Adriatic are quantities so reduced as to prepare us for stringency in supply of foreign flour between now and October. The extreme scarcity of milling offals, such as Bran, Middlings, Sharps, and Pollard, has been a feature of the month, and prices have risen a full sovereign on the ton. The new crop of wheat is now relieving the market, and with increased supplies of milling flour will come corresponding increase in the by-products of the mill.

Barley.—The imports and home deliveries of this cereal have both been very small, and if demand had not been limited likewise prices

must have made a leap forward. Even as it is, the home average for barley for the last week in August is in striking contrast to that for the first week, and the value of imported feeding grain has been steadily rising. The quality of new-crop barley appears to be excellent, and we note a feature not recorded since 1906—namely, an extensive sale to the merchant instead of to the maltster. The latter is not accustomed to act much before Michaelmas, but where an early and good crop occurs the middleman steps in and secures produce from the farmer. His hope, of course, is to resell to the brewing interest at a profit a little later on. August shipments of barley from Russia were 1,319,000 qrs., no other exporter doing anything worth mentioning. The quantity on passage on the 31st was 430,000 qrs.—a fair but in no way remarkable total.

Oats.—Winter oats, having a market of their own, are usually in evidence about a fortnight before the usual harvest, and they are responsible for many Press reports of harvest commencing early. The new winter oats this year are of excellent quality, and make 20s. per 336 lb. without difficulty. New spring oats came on sale in fair quantity by about the 21st in the South, and 28th in the North of England. Prices asked were 19s. to 20s. for ordinary, and 20s. to 21s. for the named sorts of good weight. Imported oats are held very firmly; 18s. for the 304 lb. kinds is the usual price. Shipments for August were 600,000 qrs. from Russia, 128,000 qrs. from North America, and 210,000 qrs. from La Plata. The quantity on passage on the 31st was 310,000 qrs.

Maize.—The shipments of round corn—920,000 qrs. from Russia and 936,000 qrs. from "Europe, S.E."—were quite remarkably large, and prevented the small shipments of the New World (186,000 qrs. U.S., 6,000 qrs. La Plata) from causing the substantial price-rise which would otherwise have been recordable. Even as it was, however, the month saw 1s. advance and a hardening tendency at the close. There is but a small supply on passage, and this makes higher prices in the next few weeks a probability, stocks being low. The closing return of supply on passage (470,000 qrs.) was much below current requirements.

Oilseeds.—The new English crop of rapeseed is of fine weight and grade, and fetches 66s. per 424 lb. without difficulty. But the supply is too small to affect the general market, which in August was mainly concerned with Indian linseed at 71s. to 72s. per 410 lb., Argentine linseed at 67s. to 69s. per 416 lb., Egyptian cottonseed at 8s. 3d. to 8s. 6d. per cwt., and Guzerat rapeseed at 56s. to 59s. per 416 lb. There were buyers of sunflowerseed at 14s. to 16s. per cwt., according to "boldness" of sample, and the analyses of this oilseed are asserted by authorities not unworthy of attention to be such as to justify a good demand. The quantity of linseed on passage on the 31st was 170,000 qrs.; of cottonseed, 20,000 tons; and the month closed with a strongly upward tendency in all oilseeds.

Various.—The dry summer increased the demand for beet sugar, and 15s. to 15s. 3d. per cwt. was paid on the last few days of the month. A cargo of 15,000 qrs. of soy beans reached London on the 24th, and met with a good demand. New English beans, peas, and tares show very fine quality, and sell well. Beans are so hard that they can be used for splitting without delay—a circumstance of an

unusual nature. Tares have seldom shown such intrinsic quality, and 8*s.* per qr. is paid for best winter. The new rye is in good request, and has advanced from 26*s.* to 28*s.* per qr.

THE LIVE AND DEAD MEAT TRADE IN AUGUST.

A. T. MATTHEWS.

Fat Cattle.—The trying position caused by the drought, which has lasted with brief intervals for many months, became critical in August, no rain falling till the 21st in many parts of England. Partial falls then took place, sufficient to refresh the roots and slightly brighten up the pastures, but far too little to relieve the situation by starting a new growth. Very early in the month there was a visible change for the worse in the condition of the animals coming to market, which up to that time had been wonderfully well maintained; but it has since been declining week by week till the bulk of the animals shown at the Metropolitan Market were in little more than good store condition. In these circumstances they are, of course, weighing badly, and prices are depressed.

Taking into consideration the low intrinsic value of the animals to the butcher through their deficiency in internal fat, prices have been well maintained, as will be seen by the following statement of comparative averages:—Shorthorns, 8*s.*, 7*s.* 3½*d.*, and 6*s.* 3*d.* for August, against 8*s.* 0½*d.*, 7*s.* 4½*d.*, and 6*s.* 4*d.* in July; Herefords, 8*s.* 4½*d.* and 7*s.* 7*d.*, against 8*s.* 3½*d.* and 7*s.* 7*d.*; Devons, 8*s.* 2*d.* and 7*s.* 4½*d.*, against 8*s.* 1½*d.* and 7*s.* 4*d.*; and Scots, 8*s.* 3½*d.* and 8*s.*, against 8*s.* 4½*d.* and 8*s.* 0½*d.* Welsh Runts have begun their season, and averaged 7*s.* 9*d.* and 7*s.* 3½*d.* per stone.

The drought has been less severe in Scotland, and this probably accounts for the better trade that has been experienced there, the markets being less heavily supplied with half-fat cattle.

It is generally expected that the late autumn and winter will bring short supplies and higher prices.

Veal Calves.—Fat calves in over twenty of the leading English and Scotch markets were very uniform in their average value during August. It was 8*d.* per lb. for first and 7*d.* for second quality. Their value in different markets, however, varied extremely, ranging from 7½*d.* in some centres to as much as 10*d.* in others for best quality.

Fat Sheep.—There is no doubt that the low price of sheep constitutes the worst feature of the present position of British farming, and the long drought for which the present summer will be remembered has come at a most unfortunate time, for it has certainly postponed the possibility of improvement. With the green fodder scorched up and roots struggling for life, the demand for stores has been almost nil, and therefore farmers have been driven to send to the fat-stock markets large numbers of sheep in half-meated condition. In these circumstances the course of the trade in August has been better than might have been expected. In fact, the slight improvement shown suggests a fairly healthy demand, and points to higher prices if we are favoured with a growing autumn. In about twenty English markets Downs

averaged a fraction more in August for first quality than in July; second quality advanced $\frac{1}{4}d.$, and ewes were unchanged. Longwools averaged $\frac{1}{4}d.$ more for all qualities. The general averages were:—Downs, $7\frac{1}{4}d.$ (with a fraction over) for first, $6\frac{1}{2}d.$ for second, and $5\frac{1}{4}d.$ for third quality; and Longwools, $6\frac{3}{4}d.$, $6d.$, and $4\frac{3}{4}d.$ per lb. As an example of the difference in markets it may be noted that in the third week Downs fetched 8d. per lb. at Norwich, Salford, and Wakefield, which was just 1d. per lb. more than they were worth at Hereford and York.

Fat Lambs.—The average price of fat lambs in about forty British markets was decidedly lower than in July. Best quality averaged nearly $8\frac{3}{4}d.$, and second $7\frac{3}{4}d.$ per lb.—a decline of $\frac{1}{2}d.$ per lb. on the month.

Fat Pigs.—The trade for bacon pigs was fairly steady, with a very slight improvement towards the end of the month. The average price in British markets was 6s. $3\frac{3}{4}d.$ for prime small, and 5s. 9d. for larger pigs.

Carcass Beef—British.—The value of Scotch beef in the London Central Market was, during August, a very uncertain quantity, owing first to the carmen's and afterwards to the railway strikes. In the second week it went up over 1d. per lb. for a few days but soon returned to the normal level. The average price of short sides was $7\frac{1}{4}d.$ per lb., and of long sides $6\frac{1}{2}d.$. English sides averaged 6d. and $5\frac{5}{8}d.$ for first and second quality.

Port-killed Beef.—Deptford-killed American beef was steady in value at $5\frac{5}{8}d.$ for the best quality all the month, except in the strike week, when it rose to 7d. per lb.

Chilled Beef.—As in the second week no chilled beef could be got into the London market, the average price for the month was not affected by the strike. There was a small quantity of chilled States beef on offer, and its average price may be placed at 6d. per lb. for hinds and at $3\frac{3}{4}d.$ for fore. Argentine chilled was very plentiful, and hind quarters averaged about $3\frac{1}{2}d.$ per lb. and fore 2d. It is not publicly known what quantity was destroyed during the strike.

Frozen Beef.—For once the frozen beef was found useful, as for a short time it was almost the only beef available. It was promptly doubled in price during the strike of the carmen. Its average price for the month at Smithfield works out at about $3\frac{3}{4}d.$ per lb. for hind quarters, and $2\frac{7}{8}d.$ for fore quarters.

Carcass Mutton—Fresh Killed.—Mutton was very little affected by the strike, and prices were about normal. The average price of prime small Scotch in London was 7d. per lb.; of best English on offer, $6\frac{1}{4}d.$; and of Dutch, about 6d. per lb.

Carcass Lamb.—The best British lamb stood at $7\frac{1}{2}d.$ per lb. all the month, except in the second week, when it made $8\frac{1}{2}d.$. Fine Dutch lamb made 7d. per lb., and New Zealand $5\frac{3}{4}d.$.

Frozen Mutton.—There is less frozen mutton and lamb in the London storage at the present moment than there has been for a very long time past, stocks being cleared out during the strike, and this has since given firmness to the trade. Frozen mutton advanced about $\frac{1}{2}d.$ per lb. during the strike. The best Canterbury averaged $4\frac{1}{2}d.$., and the best Australian $3\frac{3}{4}d.$ per lb.

Veal.—The supplies of good veal in London were small, but about equal to the demand. It is often difficult to find a really prime carcass of British veal in the London market, but the small quantity on offer has generally been worth 8d. per lb.

Pork.—British pork has fetched from $5\frac{1}{2}$ d. to 6d. per lb., and the small quantity of Dutch about $5\frac{1}{2}$ d. Heavy sows have fetched about $4\frac{1}{2}$ d. per lb.

THE PROVISION TRADE IN AUGUST.

HEDLEY STEVENS.

Bacon.—On account of the dock and transport strikes, and the difficulties experienced in obtaining sufficient supplies to satisfy the demands of their customers, the month of August has been a most trying one for all dealers in provisions. Importers have had to face very serious losses also through their perishable goods being exposed to the weather and getting out of condition. In some cases the liners have taken large portions of their cargo back to America, as they could not land it at Liverpool. This means, of course, that the goods will cross the Atlantic three times, and in some cases provisions will be stowed in the holds of the steamers for about five or six weeks. In consequence of this scarcity of supplies, prices have considerably advanced during the month, more especially for Canadian and American bacon and hams. It is anticipated that when the congestion of traffic which is existing at the end of the month is worked off, lower prices will prevail.

The demand for hog products in America is still reported to be good, and prices remain high. During August the prices for hogs at Chicago fluctuated from \$6.85 to \$7.80, against \$7.40 to \$9.25 last year, and \$7.35 to \$8.20 two years back. In the western States the total slaughter of hogs since March 1st to the middle of August was about 3,200,000 in excess of the same period last year, when the quantity was abnormally small. Arrivals from Canada are still on the short side, prices being below those current at the same time last year.

English pigs have been marketed in small quantities only, and prices remain almost unchanged.

Cheese.—Deliveries have been seriously interfered with by the strikes. Canada has recently experienced rain and cooler weather, but it came too late to make up the shortage earlier in the season. Towards the end of July and early in August the make of cheese fell off 30 per cent. in some parts of the country. Prices have steadily advanced throughout the month, and the Canadian factorymen are now demanding equal to 66s. to 66s. 6d. c.i.f. for their best sections of August make. This is higher than for some years past. On spot the advance for the month has been from 3s. to 6s. per cwt., which at the top shows an advance of about one penny per lb. above the prices current at the same time last year. Those best able to judge estimate the shortage of Canadian cheese on September 1st in the United Kingdom and Canada to be about 250,000 boxes. The *Montreal Trade Bulletin*, dated August 18th, says: "Prices seem to us to be getting extreme, and the consensus of opinion is that a reaction is about due. The

market has been steadily advancing since the end of May, and although there is a shortage in the make, both in Britain and here, the fact of prices being ten shillings higher than a year ago makes one think that any bull features that may transpire in either country are fully discounted."

The high prices of Canadian cheese have turned importers' attention to the contracting of New Zealands earlier than usual, and sales have been made at as high as 63s. c.i.f. for monthly shipments from October, 1911, to May, 1912. This price is considered by many to be dangerously high.

At the end of the month the estimated stocks of Canadian cheese at the three principal distributing centres (London, Liverpool, and Bristol) were 214,000 cheese, against 340,000 at the same time last year, and 295,000 two years ago. The stock of New Zealand cheese was 2,250 crates in London and Bristol, against 3,250 last year.

English cheese has been in good demand, but on account of the continued dry weather the quality is irregular, and the make continues to show a shortage. Really first-class Cheddars will realise good prices during the coming winter.

Butter.—This article has been in good demand, and prices have advanced considerably, in some cases as much as 14s. per cwt. on the month. Irish Creameries have made from 11s. to 15s. 6d. above the prices current in August of last year, the make being much smaller, and there is also a broadening demand for this class of butter in the North of England.

In spite of the dry weather in Canada, the receipts of butter in that country continue in excess of last year, which is accounted for by the much smaller quantities of raw cream shipped into the United States this season. Prices have permitted a continued export trade, although at the time of writing they have been advanced to 124s. c.i.f., which is beyond the importers' ideas of value.

Some contracts for the season's output of certain factories of New Zealand butter have been put through at about 112s. to 114s. c.i.f., but 116s. to 117s. is now asked, and this stops the business for the time.

Eggs.—Deliveries have been considerably disorganised by the strikes, and serious losses incurred by importers on delayed parcels. Prices are generally higher, with a good demand for strictly fresh consignments.

FRUIT AND VEGETABLE TRADE IN AUGUST.

W. W. GLENNY.

Apples.—A plentiful supply of English fruit has been offered throughout the month at fair prices, beginning at nearly 5s. per half-bushel for best dessert, and about the same figure per bushel for good cooking apples, such as Ecklinville. At the end of the month the value of large cookers, such as Warner's King or Lord Grosvenor, was 3s. to 3s. 6d. per bushel, while Keswick and Suffields were worth less. Prime table apples were worth nearly double the price of culinary ones.

Pears.—The trade has been mostly in French Williams, which were

at first worth about 8s. per box of forty-eight pears, but declined during the month to 3s. to 3s. 6d. for the same quantity. During the last three weeks British Jargonelle and Calabash, the former a well-known old variety, were on offer at 3s. or 4s. per half-bushel, according to quality; while Chalks, Hessle, and Lamas could be purchased for about 3s. to 3s. 6d. per half-bushel.

Greengages.—Fine samples, well graded, of Spanish origin, have taken the lead in this fruit. At the beginning of the season the price was 10s. to 12s. the half-bushel. At the end of the month the best Spanish were worth 8s. 6d.; French, 5s.; home-grown, 4s. 6d., per half-bushel.

Plums.—Consignments of plums have largely increased as the month advanced. Early Rivers, Czars, Orleans, and Prolifics began at 4s. to 5s. 6d. per half-bushel, while towards the close of the month Monarchs and Victorias arrived in abundance. Kent goods are preferred as better graded than Evesham, and have been offered at as low as 2s. 6d. or 2s. per half-bushel.

Potatoes.—Potatoes began the month at 4s. 6d. to 5s. per cwt., and cannot be said to have altered much. Supplies are now coming more freely, as corn is gathered and workmen are released for digging. Edward VII. and Blackland are down to about 4s. per cwt., though Duke of York and Puritans are only slightly easier. When the winter varieties come to be lifted in October it will be safer to predict what prospects are, though the general opinion is that the drought has materially affected late-planted potatoes which furnish our winter store. The crop is said to be light in the North, and, if the Continent of Europe has also a shortage, prices are likely to advance later on.

Last winter and spring potatoes were exported to France because of the bad crop there, and French buyers sought for the variety known as King Edward VII., which is a favourite beyond the Channel.

Onions.—Egypt has furnished us with useful onions most of the month at figures between 4s. to 6s. 6d. per cwt. The season now is about closed. Valencia cases have not been satisfactory, and prices consequently dropped for some consignments to 4s. and 5s. per case—a low figure for these onions. An improvement set in at the close of the month, the price reaching 7s. Figures are gradually hardening at this moment, and the result of the drought is pretty evident by the size of the bulbs. Dutch realise 8s. to 8s. 6d., and home-grown 8s. 6d. to 10s. per cwt., which is a fair price for growers.

Peas and Beans.—The former popular vegetable is a diminishing quantity. Autocrats and Yorkshire Hero are available in small quantities at 8s. to 9s. per bushel, but a brisk demand exists because scarlet runners are scarce, owing to the drought. Beans have consequently risen in the course of four weeks from 6s. to 10s. per bushel (40 lb. net). A few of Dutch growth realised about 5s. for the same quantity.

Cabbage, Cauliflower, and Lettuce.—Most succulent vegetables are affected by the dry season, and cabbages fetch 1s. 6d. per dozen. Cauliflowers have failed altogether in some gardens, and fetch 3s. per dozen when of snow-white colour. Good lettuces are scarce. Solid-hearted Cos would be worth 2s. per score, while cabbage lettuces are readily purchased by restaurant providers for 1s. a dozen—an excellent price.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of August, 1911.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
	per stone.*	per stone.*	per cwt.†	per cwt.†
FAT STOCK:—				
Cattle:—				
Polled Scots	8 3	7 11	39 10	36 6
Herefords	8 5	7 6	—	—
Shorthorns	8 0	7 3	38 6	35 8
Devons	8 2	7 5	—	—
Veal Calves	per lb.* d. 8½	per lb.* d. 7½	per lb.* d. 8½	per lb.* d. 7
Sheep:—				
Downs	7½	6½	—	—
Longwools	6¾	6	—	—
Cheviots	8	7½	7¾	6¾
Blackfaced	7½	7	7½	6½
Cross-breds	7¾	6½	7¾	6¾
Pigs:—	per stone.*	per stone.*	per stone.*	per stone.*
Bacon Pigs	s. d. 6 6	s. d. 5 11	s. d. 6 1	s. d. 5 5
Porkers	6 11	6 4	6 6	5 8
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	21 15	18 1	22 5	17 13
" —Calvers... ...	19 16	16 18	20 3	16 18
Other Breeds—In Milk ...	18 6	16 2	20 6	16 11
" —Calvers ...	15 5	13 5	19 8	16 7
Calves for Rearing ...	2 3	1 12	2 7	1 13
Store Cattle:—				
Shorthorns—Yearlings ...	9 10	7 13	9 17	8 11
" —Two-year-olds... ...	12 8	11 1	14 16	12 2
" —Three-year-olds ...	16 15	14 5	17 7	15 0
Polled Scots—Two-year-olds	—	—	14 17	15 6
Herefords— "	—	12 7	—	—
Devons— "	—	—	—	—
Store Sheep:—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	26 1	21 8	—	—
Scotch Cross-breds ...	—	—	25 8	20 2
Store Pigs:—				
8 to 10 weeks old ...	16 5	12 6	18 4	15 3
12 to 16 weeks old ...	25 2	18 11	27 9	—

* Estimated carcass weight.

† Live weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of August, 1911.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birming-ham.		Liver-pool.		Lon-don.		Man-chester.		Edin-burgh.		Glas-gow.	
		per cwt.	s. d.	per cwt.	s. d.	per cwt.	s. d.	per cwt.	s. d.	per cwt.	s. d.	per cwt.	s. d.
BEEF :—													
English	1st	54	0	55	0	55	6	54	6	57	6*	57	0*
	2nd	49	0	51	0	52	6	51	6	51	6*	53	0*
Cow and Bull ...	1st	46	0	47	0	45	6	47	6	48	0	46	0
	2nd	40	0	41	0	41	6	44	0	39	.6	42	0
U.S.A. and Cana-dian :—													
Port Killed ...	1st	—		54	0	56	0	54	0	—		55	0
	2nd	—		49	6	52	6	52	0	—		52	6
Argentine Frozen—													
Hind Quarters ...	1st	34	6	34	0	36	6	34	6	35	0	34	0
Fore „ „ „	1st	24	6	24	6	25	6	23	6	25	0	24	0
Argentine Chilled—													
Hind Quarters ...	1st	35	0	36	0	34	0	39	6	36	6	35	6
Fore „ „ „	1st	24	0	20	0	20	0	20	0	23	0	22	0
Australian Frozen—													
Hind Quarters ...	1st	33	0	32	0	36	6	32	0	—		32	0
Fore „ „ „	1st	25	0	21	6	25	6	23	6	—		23	6
VEAL :—													
British	1st	60	6	64	6	72	6	62	6	—		65	6
	2nd	52	0	58	0	60	6	57	6	—		—	
Foreign	1st	—		—		73	0	—		66	6	59	6
MUTTON :—													
Scotch	1st	—		68	0	65	6	68	6	64	6	66	0
	2nd	—		63	6	59	6	64	6	56	6	54	6
English	1st	59	0	63	6	57	0	64	6	—		—	
	2nd	51	0	59	0	53	6	60	0	—		—	
Argentine Frozen ...	1st	36	0	36	6	35	0	36	0	35	6	36	0
Australian „ „ „	1st	35	0	35	6	35	0	36	0	—		33	0
New Zealand „ „ „	1st	—		—		39	0	—		—		35	0
LAMB :—													
British	1st	—		71	0	71	0	72	0	67	0	66	6
	2nd	64	0	65	0	64	6	66	6	60	0	54	0
New Zealand ...	1st	54	6	52	6	52	0	52	0	53	6	52	6
Australian	1st	46	6	45	6	46	6	44	6	—		40	6
Argentine	1st	46	6	45	6	46	6	45	6	41	0	41	0
PORK :—													
British	1st	60	6	59	6	56	6	60	6	51	6	56	0
	2nd	50	6	55	0	51	0	56	0	45	6	52	6
Foreign	1st	—		—		52	0	—		—		—	

* Scotch.

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1909, 1910 and 1911.

Weeks ended (in 1911).	WHEAT.			BARLEY.			OATS.					
	1909.		1910.	1909.		1910.	1909.		1910.	1909.		
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	
Jan. 7 ...	32	9	33	6	30	5	26	11	24	11	23	11
„ 14 ...	32	8	33	8	30	8	27	1	24	11	23	10
„ 21 ...	33	2	33	9	30	11	27	3	24	11	24	4
„ 28 ...	33	0	33	6	30	11	27	6	25	0	24	5
Feb. 4 ...	33	4	33	7	30	9	27	7	24	10	24	5
„ 11 ...	33	8	33	4	30	5	27	8	24	9	24	6
„ 18 ...	34	1	33	0	30	3	27	11	24	6	24	7
„ 25 ...	34	5	32	7	30	2	28	0	24	2	24	9
Mar. 4 ...	34	10	32	7	30	0	27	11	24	6	25	0
„ 11 ...	35	8	32	6	30	1	28	4	24	1	25	0
„ 18 ...	35	9	32	6	30	1	28	0	23	6	24	11
„ 25 ...	36	0	32	9	30	2	28	0	23	7	25	0
Apl. 1 ...	36	5	33	0	30	3	27	10	23	8	24	11
„ 8 ...	37	4	33	6	30	4	28	0	23	1	24	7
„ 15 ...	38	7	33	7	30	3	27	8	23	5	25	2
„ 22 ...	41	4	33	7	30	4	28	2	23	0	25	5
„ 29 ...	42	5	33	0	30	11	27	10	22	10	25	5
May 6 ...	40	9	32	6	31	4	27	7	22	7	25	7
„ 13 ...	41	6	32	1	31	8	27	3	22	0	25	1
„ 20 ...	42	8	31	10	32	6	27	0	21	8	25	4
„ 27 ...	42	6	31	3	32	8	26	3	21	4	25	0
June 3 ...	43	1	30	2	32	5	25	7	21	8	24	10
„ 10 ...	42	11	29	1	32	4	26	10	20	9	25	7
„ 17 ...	42	7	29	0	32	3	26	10	18	11	23	11
„ 24 ...	42	8	29	4	31	11	27	2	20	1	23	9
July 1 ...	42	9	29	9	31	10	27	2	19	11	24	5
„ 8 ...	43	0	30	4	32	1	26	4	19	5	25	10
„ 15 ...	43	3	31	1	32	3	26	10	21	3	25	10
„ 22 ...	44	0	31	11	32	5	27	4	19	9	24	3
„ 29 ...	43	5	33	5	32	5	24	6	20	10	23	8
Aug. 5 ...	44	9	33	9	32	0	27	4	20	5	24	4
„ 12 ...	44	9	33	5	31	6	24	9	20	4	26	9
„ 19 ...	41	6	32	11	31	6	23	11	20	11	27	8
„ 26 ...	38	5	32	7	31	8	24	7	20	10	28	10
Sept. 2 ...	37	2	32	2	31	7	26	3	22	10	28	4
„ 9 ...	34	11	31	11	31	10	26	1	23	3	28	4
„ 16 ...	33	6	30	11			26	5	24	3		
„ 23 ...	32	9	30	2			26	8	24	2		
„ 30 ...	32	2	30	1			26	9	24	4		
Oct. 7 ...	31	8	30	1			26	9	24	7		
„ 14 ...	31	4	30	2			27	0	25	1		
„ 21 ...	31	8	30	4			27	7	25	3		
„ 28 ...	31	10	30	4			27	9	25	4		
Nov. 4 ...	32	5	30	4			27	9	25	6		
„ 11 ...	32	5	29	11			27	7	25	4		
„ 18 ...	32	7	29	8			27	0	25	1		
„ 25 ...	33	0	29	11			26	8	24	10		
Dec. 2 ...	33	3	30	6			26	1	24	7		
„ 9 ...	33	3	30	9			25	7	24	3		
„ 16 ...	33	2	30	7			25	3	23	9		
„ 23 ...	33	1	30	7			25	2	23	10		
„ 30 ...	33	3	30	5			25	1	23	9		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and BRESLAU.

	WHEAT.		BARLEY.		OATS.	
	1910.	1911.	1910.	1911.	1910.	1911.
France : July	42 10	43 8	25 4	26 8	21 1	22 4
August	45 8	42 4	25 4	26 4	21 3	21 9
Paris : July	45 6	43 8	23 6	26 6	21 7	23 4
August	48 10	43 4	23 11	26 3	22 1	22 11
Belgium : June	31 11	34 10	22 8	27 4	19 8	21 10
July	33 10	34 3	22 4	24 2	20 2	21 7
Germany : June	40 5	42 7	24 3	28 8	20 1	25 0
July	41 11	43 4	24 3	27 1	20 11	25 1
Berlin : June	42 9	44 4	—	—	20 5	23 3
July	45 4	45 8	—	—	21 0	23 2
Breslau : June	39 7	40 5	{ 25 4* 22 11† }	{ 24 9† — * — *	{ 19 3 — }	22 10
July	40 11	41 6	{ 22 11† — }	{ 24 9† — }	{ 19 8 — }	22 11

* Brewing.

† Other.

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of August, 1910 and 1911.

	WHEAT.		BARLEY.		OATS.	
	1910.	1911.	1910.	1911.	1910.	1911.
London... ...	33 3	32 9	21 3	28 5	18 5	19 3
Norwich	32 11	31 8	21 6	27 9	17 9	18 4
Peterborough	32 6	31 3	21 4	27 7	17 8	17 11
Lincoln... ...	33 0	31 9	—	27 9	18 7	17 11
Doncaster	33 2	31 8	21 0	26 9	18 10	19 4
Salisbury	33 7	30 11	21 1	25 2	17 5	17 11

AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND and SCOTLAND in the Month of August, 1911.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Bristol.		Liverpool.		London.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
BUTTER :—								
British ...	s. d. per 12 lb. 14 6	s. d. per 12 lb. 13 6	s. d. per 12 lb. —	s. d. per 12 lb. —	s. d. per 12 lb. 14 6	s. d. per 12 lb. 13 6	s. d. per 12 lb. —	s. d. per 12 lb. —
Irish Creamery ...	per cwt. 122 0	per cwt. 117 6	per cwt. 122 0	per cwt. 119 0	per cwt. 126 0	per cwt. 122 0	per cwt. 123 0	per cwt. 114 0
„ Factory ...	112 0	107 0	107 6	99 6	111 0	107 0	—	—
Danish ...	—	—	130 6	127 6	129 6	127 6	127 6	—
French ...	—	—	—	—	134 0	129 0	—	—
Russian ...	116 0	110 6	114 6	111 0	116 0	112 6	113 0	104 0
Canadian ...	123 0	118 6	119 6	116 6	—	—	121 0	—
Australian ...	118 0	112 6	—	—	119 0	115 0	—	—
CHEESE :—								
British—								
Cheddar ...	72 0	67 0	72 0	70 0	73 0	68 0	64 6	62 6
Cheshire ...	—	—	120 lb. 67 6	120 lb. 62 0	120 lb. 76 0	120 lb. 69 6	—	—
Canadian ...	63 0	61 6	per cwt. 62 6	per cwt. 60 6	per cwt. 64 0	per cwt. 63 0	63 0	—
BACON :—								
Irish ...	72 6	68 0	69 6	64 0	74 6	71 0	74 6	—
Canadian ...	67 6	65 0	64 6	60 6	67 0	65 0	—	—
HAMS :—								
Cumberland ...	—	—	—	—	109 0	100 0	—	—
Irish	—	—	—	—	107 0	99 6	111 6	—
American (long cut)	74 6	72 0	74 6	70 6	77 0	73 0	75 6	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ...	11 8	10 2	—	—	12 11	11 3	—	—
Irish ...	9 11	9 4	10 1	9 2	10 7	9 3	9 9	9 3
Danish ...	10 5	9 10	10 4	9 8	10 10	9 7	10 2	9 4
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Snowdrop ...	95 0	85 0	86 6	81 6	80 0	75 0	—	—
Edward VII.	91 6	85 0	78 6	—	85 0	76 6	—	—
Up-to-Date ...	90 0	80 0	71 6	—	85 0	76 6	73 6	—
HAY :—								
Clover ...	98 6	87 6	95 0	75 0	100 0	88 6	68 0	60 6
Meadow ...	88 0	72 6	—	—	89 0	68 6	—	—

DISEASES OF ANIMALS ACTS, 1894 TO 1910.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	AUGUST.		EIGHT MONTHS ENDED AUGUST.	
	1911.	1910.	1911.	1910.
Swine-Fever: —				
Outbreaks	169	87	1,737	971
Swine Slaughtered as diseased or exposed to infection ...	2,022	698	20,257	8,712
Anthrax: —				
Outbreaks*	49	91	561	980
Animals attacked	65	108	704	1,186
Foot-and-Mouth Disease: —				
Outbreaks	1	1	8	2
Animals attacked	5	1	425	15
Glanders (including Farcy): —				
Outbreaks	11	37	125	248
Animals attacked	12	113	303	762
Sheep-Scab: —				
Outbreaks	3	9	306	335

* For 1910 the figures show the outbreaks reported, but for 1911 the outbreaks confirmed.

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	AUGUST.		EIGHT MONTHS ENDED AUGUST.	
	1911.	1910.	1911.	1910.
Swine-Fever: —				
Outbreaks	14	6	90	71
Swine Slaughtered as diseased or exposed to infection ...	193	140	1,575	1,693
Anthrax: —				
Outbreaks	1	—	7	5
Animals attacked	5	—	12	8
Glanders (including Farcy): —				
Outbreaks	—	—	2	1
Animals attacked	—	—	3	2
Sheep-Scab: —				
Outbreaks	8	7	253	348

SELECTED CONTENTS OF PERIODICALS.

Agriculture, General and Miscellaneous—

Die Entwicklung der Bodenkultur in Deutschland während der letzten 25 Jahre, *Dr. Falke*. [A. 28.] Die landwirtschaftliche Pflanzenzüchtung in Deutschland in den letzten 25 Jahren, *Beseler*. [B. 17.] Die wissenschaftlichen Grundlagen der Saatzucht in Deutschland in den letzten 25 Jahren, *Wittmack*. [B. 18.] Die Verwendung künstlicher Düngemittel in Moor, Heide und Marsch, *Dr. Tacke*. [B. 52.] (Jahrb. Deut. Landw. Gesell., Band 26, 1 Lieferung, Juni, 1911.)

The Raised Turf System of Planting Bog-land, *W. Dallimore*. (Kew Bulletin, No. 5, 1911.) [B. 52.]

Organisation of Agricultural Women in Belgium. (Dept. Agr. and Tech. Instr. Ireland Jour., July, 1911.) [B. 44-15.]

The nature, distribution and effects upon vegetation of atmospheric impurities in and near an industrial town, *C. Crowther* and *A. G. Ruston*. [B. 16-7.] On the absorption of ammonia from the atmosphere, *A. D. Hall* and *N. H. J. Miller*. [B. 22-5.] (Jour. Agr. Sci., Vol. IV., Pt. I., May, 1911.)

Field Crops—

Der Einfluss verschiedener Aussaatstärke, sowie der Düngung und Behäufelung auf den Ertrag und die Zusammensetzung des Hafers, *Dr. W. Ebert*. (Mitt. Landw. Inst. Leipzig, Heft X., 1911.) [C. 16.]

Growing Tobacco for Nicotine Purposes. [C. 54; E. 20-5.] The Cultivation of Potatoes in Holland. [C. 26-3.] (Dept. Agr. and Tech. Instr. Ireland Jour., July, 1911.)

Recherches botaniques sur les variétés cultivées du *Solanum tuberosum* et les espèces sauvages de *Solanum tubérisères* voisins, *P. Berthault*. (Ann. Sci. Agron., Juillet, 1911.) [C. 26-3.]

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Die Entwicklung des deutschen Obstbaues in den letzten 25 Jahren, *Echtermeyer*. (Jahrb. Deut. Landw. Gesell., Band 26, 1 Lieferung, Juni, 1911.) [D. 4.]

La culture du champignon de couche. (Bul. Mens. Off. Renseig. Agr. [Paris], Juin, 1911.) [D. 44.]

Plant Diseases—

The action of carbon dioxide on Bordeaux mixtures, *C. T. Gimingham*. [E. 20-7.] The fungicidal action of Bordeaux mixtures, *B. T. P. Barker* and *C. T. Gimingham*. [E. 20-7.] (Jour. Agr. Sci., Vol. IV., Part I., May, 1911.)

Contribution à l'Étude des Maladies des Pommes et des Poires, *E. Griffon* and *A. Maublanc*. (Ann. Inst. Nat. Agron., 2^e Série, Tome X., Fascicule 1, 1911.) [E. 60-11.]

Considerations and Experiments on the Supposed Infection of the Potato Crop with the Blight Fungus (*Phytophthora infestans*) by means of Mycelium derived directly from the Planted Tubers, *G. H. Pethybridge*. (Sci. Proc. Roy. Dublin Soc., Vol. XIII. (N.S.), No. 2, March, 1911.) [E. 60-37.]

Zur Geschichte der Nonnenkrankheit, *C. v. Tubeuf*. (Naturw. Ztschr. Forst. u. Landw., August, 1911.) [E. 40-31.]

Live Stock—

Der Futterwert der Nigerkuchen, *Dr. Hansen*. (Mitt. Deut. Landw. Gesell., 15-29 Juli, 1911.) [F. 74-5.]

Results of Experiments in Pig-Feeding, Steer-Growing and Cattle-Fattening (Rep. Kansas State Board Agric., March, 1911.) [F. 82-1; F. 68-1.]

Measures for the Protection and Development of the National Production of Livestock in Italy. (Bul. Econ. and Social Intel., Int. Inst. Agric., II. Year, No. 5, May, 1911.) [F. 28.]

Dairying and Food, General—

Die westsibirische Milchwirtschaft mit besonderer Berücksichtigung der Molkereigenossenschaften, Dr. W. von Borowski. [G. 14; N. 4-9.] Der Einfluss der Verabreichung verminderter Nährstoffmengen auf die Milchsekretion, Dr. U. Clauss. [G. 50-7.] (Mitt. Landw. Inst. Leipzig, Heft X., 1911.)

The Inheritance of Milk Yield in Cattle, James Wilson. (Sci. Proc. Roy. Dublin Soc., Vol. XIII. (N.S.), No. 7, June, 1911.) [G. 50-1.]

Der Abschluss der dänischen Kontrollvereine im Jahre 1910, Dr. Dettweiler. (Fühling's Landw. Ztg., 1 August, 1911.) [G. 12; G. 56-7.]

Birds, Poultry, Bees, &c.—

Twelfth Annual Report of the National Poultry Organisation Society, E. Brown. (Jour. Nat. Poultry Org. Soc., July, 1911.) [K. 12-3.]

Coccidiosis in British Game Birds and Poultry, H. B. Fantham. (Jour. Econ. Biol., Vol. 6, No. 3, July, 1911.) [K. 18-3; K. 12-7.]

Forestry—

Die Tharandter Forstdüngungsversuche, H. Vater. (Tharandt. Forstl. Jahrb., 61 Band, 2 Heft, 1910. [L. 20-7.]

Notes on Trees suitable for Experimental Forestry, W. Dallimore. (Kew Bulletin, No. 5, 1911.) [L. 20-3.]

Economics—

On the Use of the "Normal Crop" as a Standard in Crop Reports, H. D. Vigor. (Jour. Roy. Stat. Soc., Vol. LXXIV., Part VII., June, 1911.) [N. 44-3.]

Sale of Butchers' Beasts and Insurance of Butchers' Beasts in Germany. [N. 8-1; H. 10.] The High Price of Meat in Germany according to a Recent Enquiry. Its Causes and Remedy by Co-operative and other Means. [N. 4-11; F. 22.] (Bul. Econ. and Social Intel., Int. Inst. Agric., II. Year, No. 5, May, 1911.)

ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of annual publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library. A list of these publications appeared in the *Journal* for October, November, and December, 1909.]

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Doncaster, L.—Heredity in the Light of Recent Research. (143 pp.) Cambridge: University Press, 1911. 1s. net. [B. 17.]

Farmer, J. Bretland.—A Practical Introduction to the Study of Botany: Flowering Plants. (276 pp.) London: Longmans, Green & Co., 1909. 2s. 6d. [B. 16-3.]

Scott, D. H..—An Introduction to Structural Botany. Part II.—Flowerless Plants. (316 pp.) London: A. & C. Black, 1907. 3s. 6d. [B. 16-3.]

Jameson, H. G..—Illustrated Guide to the Trees and Flowers of England and Wales. (136 pp.) London: Simpkin, Marshall & Co., 1909. 2s. 6d. net. [B. 16-1.]

New York Agricultural Experiment Station.—Bull. No. 333:—Seed Tests made at the Station during 1910. (12 pp.) [B. 18.] Bull. No. 335:—Spraying to Eradicate Dandelions from Lawns. (33-43 pp.) [B. 20-9.] Geneva: New York, 1911.

Rural Education Conference.—Report on the Qualification of Teachers of Rural Subjects. [Cd. 5773.] (23 pp.) 2½d. [B. 44-5.] Report on a Suggested Type of Agricultural School. [Cd. 5774.] (27 pp.) 3d. [B. 44-5.] London : Wyman & Sons, 1911.

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Michigan Agricultural Experiment Station.—Technical Bull. No. 7 :—Organic Nitrogenous Compounds in Peat Soils. II. (22 pp.) East Lansing, Michigan, 1911. [B. 40-9.]

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U.S. Dept. of Agriculture, Bureau of Animal Industry.—Circ. No. 167 :—The Dimethyl Sulphate Test of Creosote Oils and Creosote Dips ; a Substitute for the Sulphonation Test. (7 pp.) Washington, 1911. [B. 22-5.]

Royal Commission on Coast Erosion and Afforestation.—Vol. III., Part II. —Minutes of Evidence and Appendices Accompanying the Third (and Final) Report [on Coast Erosion]. [Cd. 5709.] (421 pp.) London : Wyman & Sons, 1911. 6s. 10d. [B. 56.]

Hendrick, J.—The Lime in Basic Slag. A Correction and Addition. (12 pp.) [B. 30.] Field Trials with Nitrogenous Manures from the Atmosphere. (9 pp.) [B. 28-3.] [Reprinted from the Journal of the Society of Chemical Industry, May 15th, 1911.]

Field Crops—

Purdue Agricultural Experiment Station.—Circ. No. 27 :—Suggestions for Beginners in Alfalfa Culture. (7 pp.) [C. 44-3.] Bull. No. 149 :—Summary of Five Years' Results of Co-operative Tests of Varieties of Corn, Wheat, Oats, Soy Beans and Cow Peas, 1906-1910. [C. 22; C. 36; C. 44-5.] Lafayette, Indiana, 1911.

United Provinces, Dept. of Land Records and Agriculture.—Bull. No. 6, Agricultural Series, second edition :—Notes on the Cultivation of Lucerne. (4 pp.) Allahabad, 1911. [C. 44-3.]

Local Government Board, Reports on Public Health and Medical Subjects.—No. 35 :—Dr. J. M. Hamill's Report on the nutritive value of bread made from different varieties of wheat flour. [Cd. 5831.] (53 pp.) London : Wyman & Sons, 1911. 3d. [C. 6.]

British Sugar Beet Council.—Sugar Beet Growing in Britain : Its Effects on Agriculture and Rural Life. (28 pp.) 1911. 6d. [C. 34-5.]

Tennessee Agricultural Experiment Station.—Bull. No. 90 :—Fertility Experiments in a Rotation of Cowpeas and Wheat. Part I. The Utilisation of Various Phosphates. (55-90 pp.) Knoxville, Tennessee, 1910. [C. 2-1; C. 36.]

U.S. Dept. of Agriculture, Bureau of Plant Industry.—Circ. No. 79 :—Winter Wheat in Western South Dakota. (10 pp.) [C. 2-1.] Bull. No. 210 :—Hindi Cotton in Egypt. (58 pp.) [C. 60.] Washington, 1911.

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Bailey, L. H..—The Nursery Book : a Complete Guide to the Multiplication of Plants. [Fourteenth edition.] (365 pp.) New York : The Macmillan Co., 1910. 6s. 6d. net. [D. 16-1; D. 28-5.]

New York Agricultural Experiment Station.—Bull. No. 334:—Observations on Screening Cabbage Seed Beds. (13–34 pp.) [D. 20.] Bull. No. 336:—Newer Varieties of Strawberries, and Cultural Directions. (45–77 pp.) [D. 36.] Geneva, New York, 1911.

Commonwealth of Pennsylvania, Dept. of Agriculture.—Bull. No. 201:—Market Gardening No. 2. (85 pp.) [D. 18.] Bull. No. 202:—Marketing Horticultural Products. (35 pp.) [D. 16–3.] Harrisburg, Penn., 1911.

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Hewitt, C. Gordon.—The Spruce Budworm and Larch Sawfly. [Reprint from Report of Canadian Forestry Convention, 1911.] (8 pp.) 1911. [E. 40–51; E. 40–43.]

Canada, Dept. of Agriculture, Experimental Farms.—Bull. No. 7, Second Series:—The Destructive Insect and Pest Act and Regulations issued Thereunder. (13 pp.) Ottawa, 1911. [E. 10.]

Shoebottom, J. W..—Some Records of Collembola New to England, with Description of a New Species of *Oncopodura*. [Annals and Magazine of Natural History, Ser. 8. Vol. VIII., July, 1911.] (8 pp. and plate.) 1911. [E. 40–3.]

White, Jean.—Bitter Pit in Apples. (19 pp. + 9 plates.) [Reprinted from Proc. Roy. Soc. Victoria, Vol. XXIV. (New Series), Pt. I.] 1911 [E. 60–11.]

South Carolina Agricultural Experiment Station.—Bull. No. 155:—Corn and Cotton Wire Worm (*Horistonotus curiatus*, Say). (10 pp.) [E. 40–51.] Bull. No. 158:—The Apple Tree Tent Caterpillar (*Malacosoma americana*). (8 pp.) [E. 40–51.] Clemson, S. Carolina, 1911.

U.S. Dept. of Agriculture, Bureau of Plant Industry.—Circ. No. 76:—The Relation of Crown-Gall to Legume Inoculation. (6 pp.) Washington, 1911. [E. 60–23; B. 28–5.]

U.S. Dept. of Agriculture, Bureau of Entomology.—Bull. No. 95:—Papers on Cereal and Forage Insects. Part I. The Timothy Stem-Borer (*Mordellistena ustulata*, Lec.), a New Timothy Insect. (9 pp. and plate.) [E. 40–51.] Bull. No. 96:—Papers on Insects affecting Stored Products. Part II. The Broad-Nosed Grain Weevil (*Caulophilus latinasus*, Say). The Long-Headed Flour Beetle (*Latheticus oryzae*, Waterh.). (17–28 pp.) [E. 40–51.] Washington, 1911.

Massachusetts Agricultural Experiment Station.—Bull. No. 138:—Tomato Diseases. (32 pp.) Amherst, Massachusetts, 1911. [E. 60–7.]

Dairying and Food, General—

McKay, G. L., and Larsen, C..—Principles and Practice of Buttermaking. (351 pp.) New York: J. Wiley & Sons, 1910. \$1.50 net. [G. 60–1.]

New York Agricultural Experiment Station.—Bull. No. 337:—Publicity and Payment Based on Quality as Factors in Improving a City Milk Supply. (79–114 pp.) Geneva, New York, 1911. [G. 56–9.]

Purdue Agricultural Experiment Station.—Circ. No. 26:—Milk Production. IV.—Computing Rations for Dairy Cows. (21 pp.) [G. 50–1.] Bull. No. 150:—Why do Cream Tests Vary? Factors affecting Richness of Cream. Relation of Butter Fat to Butter. [G. 56–3; G. 56–5.] Lafayette, Indiana, 1911.

Scottish Milk Records Committee.—Report on Milk Records for the Season 1910. Record of 9,514 Cows. (190 pp.) Kilmarnock: Standard Press, 1911. [G. 56–7.]

Lancaster County Council, Agricultural Dept..—Report on Milk Tests and Records, 1908–09–10. (35 pp.) Preston, 1911. [G. 56–7.]

Birds, Poultry, Bees, &c.—

- Ohio Agricultural College*.—Extension Bulletin, March, 1911:—Beneficial Habits of Snakes, Toads and Related Animals. (16 pp.) Columbus, Ohio, 1911. [K. 22.]
- Colorado Agricultural Experiment Station*.—Bull. No. 164:—Poultry Raising. (14 pp.) Fort Collins, Colorado, 1910. [K. 12-3.]
- Cornell Agricultural Experiment Station*.—Bull. No. 282:—Seven Methods of Feeding Young Chickens. (415-462 pp.) [K. 12-3.] Bull. No. 284:—Labour-Saving Poultry Appliances. (36 pp.) [K. 12-13.] Ithaca, New York, 1910.

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- Tasmania, Dept. of Lands and Surveys*.—Tasmanian Forestry, Timber Products and Saw-milling Industry. [2nd edition.] (98 pp. and map.) Hobart, 1910. [L. 18.]
- Townley, Houghton*.—English Woodlands and their Story. (309 pp.) London: Methuen and Co., 1910. 15s. net. [L. 2-1.]
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